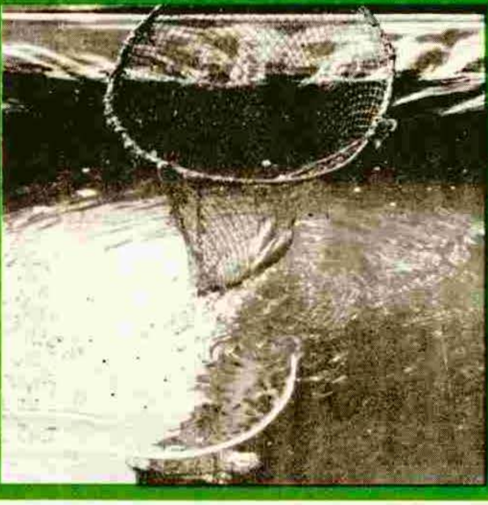
DEVELOPING TROPICAL UPLANDS

A Collection of Papers on the
ZAMBOANGA DEL SUR
DEVELOPMENT
PROJECT.

November 1983



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Originally published as a project document by one of Australia's largest aid projects, it contains general information that represents aspects of the state of knowledge of its times, the early 1980s. The project – the Zamboanga Del Sur Development Project – was not associated with the group from which the MPW Alumni arises although two of its number were the overall Project Managers across the majority of its duration, and others were technical visitors or advisers. Its re-publishing is in response to Geoff Anderson finding a copy of the original document in his library and offering it to David King who continues agricultural and wellbeing project work in The Philippines.

MPW Alumni
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D. King, P. Falvey, A. Goodman, P. Young, and others]

MPW Australia

Melbourne, January, 2021.

DEVELOPING TROPICAL UPLANDS

is

a collection of papers on

the history, development and impact

of the component programmes

of the Zamboanga del Sur

Development Project.

Prepared by

Team Members of

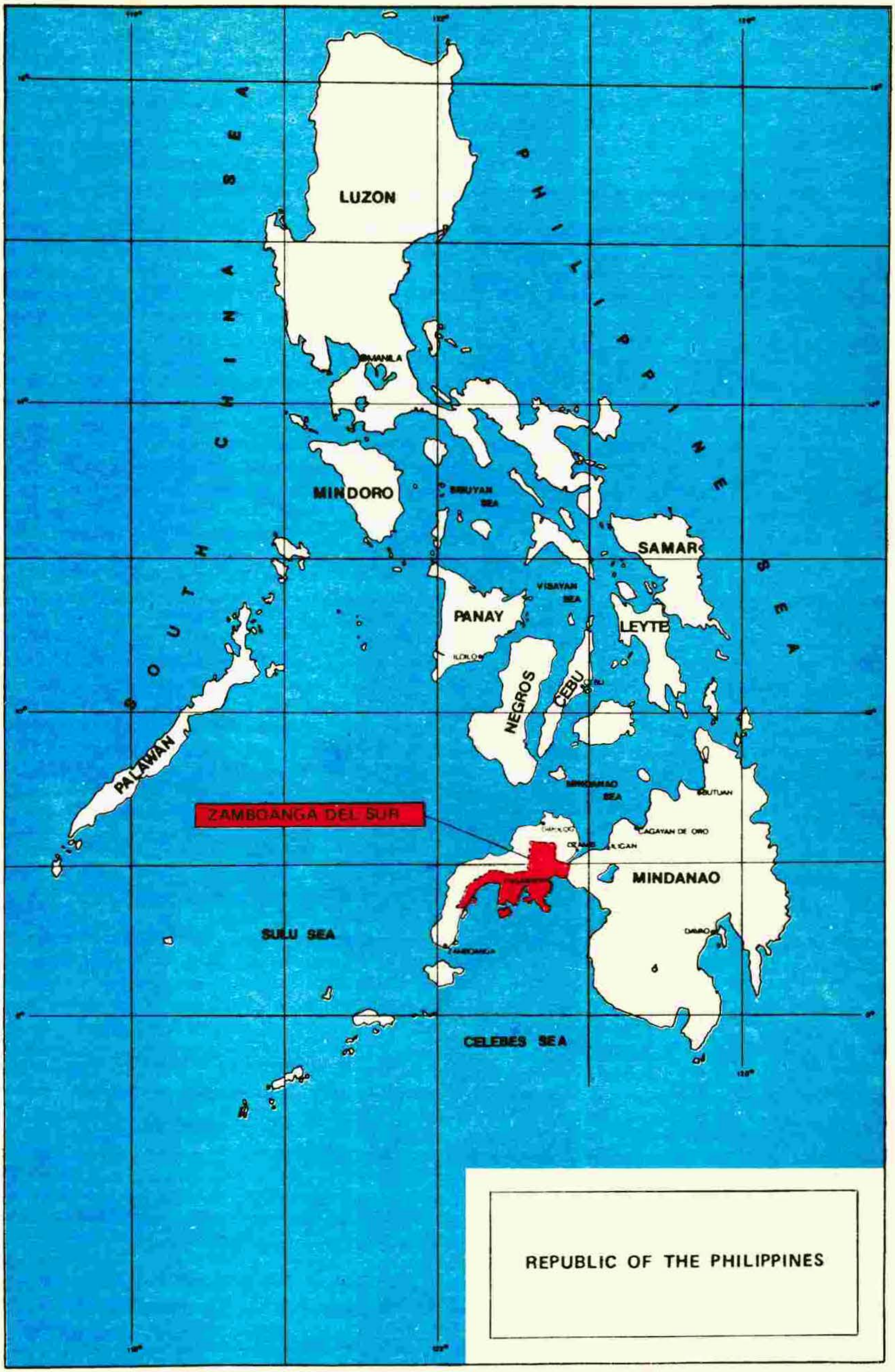
the joint venture partners

ACIL INTERNATIONAL PTY LTD

LEIGHTON CONTRACTORS PTY LTD

and

SNOWY MOUNTAINS ENGINEERING CORPORATION



Location of the Zamboanga Del Sur Development Project

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Preface

With the broad objective of raising the living standards of the majority of the population, the Zamboanga del Sur Development Project (ZDSDP) correctly identified the upland farmers as the largest social group in the Province. It also recognised the Province lacked infrastructure development, particularly roads and water supply, and had significant potential for further development of irrigation.

As a bilateral development assistance programme it was important to identify the appropriate inputs, as they related to available donor country technology and skills, and have them delivered in a manner appropriate to local conditions.

There has been considerable criticism of the Project by dissident groups in the Philippines and Australia. These groups have described the Project as an example of foreign exploitation and interference, claiming it is not helping "the poor".

The Project is a success and can boast very significant achievements in all its fields, but like all development activities, it cannot hope to please everyone or cover all areas of need.

The ZDSDP established early credibility through significant achievements in construction and rehabilitation of roads. It rapidly consolidated its efforts in integrated area development by expansion into agricultural research, production and extension, rural water supply development, irrigation and social development.

While these papers bear the names of authors, the work documented is the result of the team effort of a number of Australians from the Project's joint venture partners over many years and an even larger number of Filipinos from the private, commercial and government sectors.

The Project gratefully acknowledges the contribution and support of its sponsors the National Council on Integrated Area Development (NACIAD) of the Republic of the Philippines and the Australian Development Assistance Bureau (ADAB) in making this publication possible.

An important objective of the current phase of the Project is to ensure the continuance of programmes within the agencies after withdrawal of foreign assistance. The joint Project has 2 years to run. This collection of papers challenges the Province of Zamboanga del Sur, Region IXB and the Philippine bureaucracy to finally recognise or deny the future potential of a Project that has very significant achievements in a troubled but desperately deserving corner of Mindanao.

WAYNE J. K. HASLAM
Executive Officer
Australian Team Leader 1981-83

List of Acronyms & Abbreviations

ADAB	AUSTRALIAN DEVELOPMENT ASSISTANCE BUREAU
AI	ARTIFICIAL INSEMINATION
BAEcon	BUREAU OF AGRICULTURAL ECONOMICS
BAEx	BUREAU OF AGRICULTURAL EXTENSION
BAI	BUREAU OF ANIMAL INDUSTRY
BFAR	BUREAU OF FISHERIES AND AQUATIC RESOURCES
BFD	BUREAU OF FOREST DEVELOPMENT
BPI	BUREAU OF PLANT INDUSTRY
BRS	BETINAN RESEARCH STATION
BSF	BAGALUPA STOCK FARM
CEC	CATION EXCHANGE CAPACITY
CII	COCOA INVESTORS INCORPORATED
CIMMYT	CENTRO INTERNACIONAL de MEJORAMIENTO de MAIZ y TRIGO (MEXICO)
CSIRO	COMMONWEALTH SCIENTIFIC AND INDUSTRIAL RESEARCH ORGANIZATION (AUST.)
D	DUROC
DBP	DEVELOPMENT BANK OF THE PHILIPPINES
DFC	DAVAO FRUIT CORPORATION
FFP	FRESHWATER FISHERIES PROJECT
GOA	GOVERNMENT OF AUSTRALIA
GOP	GOVERNMENT OF THE PHILIPPINES
HYV	HIGH YIELDING VARIETY
IAD	INTEGRATED AREA DEVELOPMENT
IADP	INTEGRATED AREA DEVELOPMENT PROJECT
IBRD	INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT
ICA	INTERNATIONAL COFFEE AGREEMENT
ICO	INTERNATIONAL COFFEE ORGANISATION
IPC	INSTITUTE OF PHILIPPINE CULTURE
IRR	INTERNAL RATES OF RETURN
IRRI	INTERNATIONAL RICE RESEARCH INSTITUTE
IURON	INTERNATIONAL UPLAND RICE OBSERVATIONAL NURSERY
KKK	KILUSANG KABUHAYAN AT KAUNLARAN
L	LANDRACE
LB	LARGE BLACK
LBP	LAND BANK OF THE PHILIPPINES

LDP	LIVESTOCK DEVELOPMENT PROJECT
LRES	LAND RESOURCES EVALUATION SURVEY
LW	LARGE WHITE
MA	MINISTRY OF AGRICULTURE
MCEP	MULTIPLE CROPPING EXTENSION PROGRAMME
MCP	MULTIPLE CROPPING PROJECT
MCPP	MULTIPLE CROPPING PRODUCTION PROGRAMME
MCRP	MULTIPLE CROPPING RESEARCH PROGRAMME
MFFO	MUNICIPAL FRESHWATER FISHERIES OFFICER
MPWH	MINISTRY OF PUBLIC WORKS AND HIGHWAYS
NACIAD	NATIONAL COUNCIL FOR INTEGRATED AREA DEVELOPMENT
NCD	NEWCASTLE DISEASE
NFAC	NATIONAL FOOD AND AGRICULTURE COUNCIL
NIA	NATIONAL IRRIGATION ADMINISTRATION
OM	ORGANIC MATTER
PADAP	PHILIPPINE AUSTRALIAN DEVELOPMENT ASSISTANCE PROGRAMME
PCA	PHILIPPINE COCONUT AUTHORITY
PCARRD	PHILIPPINE COUNCIL FOR AGRICULTURE AND RESOURCES RESEARCH AND DEVELOPMENT
PCIC	PHILIPPINES CROP INSURANCE COMPANY
PEO	PROVINCIAL ENGINEER'S OFFICE
PNB	PHILIPPINE NATIONAL BANK
SALT	SLOPING AGRICULTURAL LAND TECHNOLOGY
SEAFDEC	SOUTH EAST ASIAN FISHERIES DEVELOPMENT AND EXTENSION CENTRE
T and V	TRAINING AND VISIT
TCP	TREE CROPS PROJECT
TCP 1	TREE CROPS PROJECT (CACAO/COFFEE)
TCP 2	TREE CROPS PROJECT (RUBBER)
TO	TRAINING OFFICER
UPLB	UNIVERSITY OF THE PHILIPPINES AT LOS BANOS
VSD	VASCULAR STREAK DIEBACK
ZdS	ZAMBOANGA DEL SUR
ZDSDP	ZAMBOANGA DEL SUR DEVELOPMENT PROJECT

THE ZAMBOANGA DEL SUR DEVELOPMENT PROJECT (ZDSDP)

Ian Aberdeen - Agricultural Coordinator

Initial Project Design 1973.

Late in 1972 discussions were held between the Australian Ambassador in Manila and the Government of the Philippines (GOP), to determine a basis for effective future Australian aid. The island of Mindanao and particularly Region IX was selected as the most needy for accelerated development. The Province with the least developed infrastructure in that region was Zamboanga del Sur (ZdS).

In March 1973 a small pre-feasibility study mission of three Australians and three Filipinos visited the Province for one week, and subsequently published a report (PADAP Oct. 1973). The mission confirmed the suitability of ZdS as a location for a five year Australian assistance project. It gave top priority to construction of an adequate feeder-road system, but recommended that water, agricultural and fishery development programmes should be planned for areas progressively served by the new roads.

The mission suggested that during the stage of road network planning, some pilot construction should proceed on the main trunk road down the Baganian peninsular. This activity would provide training for machine operators, and would make an early impact on the local population.

In October 1973, a team of eight Australian engineers and agriculturists from three Australian consulting groups: Snowy Mountains Engineering Corporation, Leighton Contractors and Agricultural Consultants Incorporated visited the Province for two weeks, in the company of the Australian Ambassador and two other Australian Government officials.

The report of this mission (PADAP Dec. 1973) confirmed the findings and recommendations of the previous report, and presented a specific five year project design for consideration by the GOA and the GOP. A construction programme based at Pagadian City was recommended, covering roads and irrigation works. An immediate pilot construction project was recommended, using rehabilitated dozers, graders and other equipment from the Provincial garage and the then Bureau of Public Highways. Australia would provide spare parts to get this equipment operational. The pilot project would then rehabilitate a few trunk roads, as an early training exercise.

Concurrent with this pilot construction activity, project area studies were to be undertaken to design a road network, irrigation schemes and agricultural support programmes. The basic aim of the agricultural programmes would be "to promote increased agricultural productivity in the areas served by project roads, in phase with the opening of each road, thus facilitating the early realisation of potential complementary benefits. This would involve studies of present and potential land use in the project area with a view to recommending appropriate cropping/livestock patterns and agronomic/animal husbandry practices for each section served by the roads" (PADAP Dec. 1973).

Pilot Construction 1974.

THE GOA and GOP accepted these recommendations and in February 1974 the first two of many Australians took up residence in Pagadian. By the middle of 1974 the pilot team of six had arrived and a project office was established in the Provincial Garage. Road rehabilitation commenced on the trunk road between Dumalinao and San Miguel, retaining existing alignments, but improving the pavement and drainage.

This greatly improved vehicle access down the Baganian peninsular, to San Miguel, Dinas and Lapuyan. A small but growing number of Filipino engineers, mechanics and machine operators were involved in this pilot phase. By the end of 1974 an efficient Filipino - Australian construction team had emerged.

Australian supply of construction plant and equipment began in December 1974 with the arrival of a charter ship. In March 1975, a fleet of trucks arrived to complete the establishment of the first project construction unit.

In August/September of 1974 an Irrigation Engineer from SMEC in association with NIA undertook an Irrigation Identification Study (PADAP, 1974). This study identified fourteen irrigation projects with sufficient potential to warrant further appraisal. The project included rehabilitation of the Labangan Scheme, a new 3500 ha. scheme in the Sibuguey Valley, 10 communal irrigation schemes, and improvement of drainage and flood control in the lower Salug Valley.

Detailed Project Design 1975.

In May 1975 a team of eight Australians and six Filipinos commenced a six month Project Identification and Evaluation Study. (PADAP, 1975). Most of the study time was devoted to designing a road network for the Province, and an irrigation scheme for the Sibuguey Valley. The studies followed a sequence of: -

(i) Identifying an excess of construction possibilities.

(ii) Examining the technical feasibility of each road network or irrigation scheme.

(iii) Estimating the construction and maintenance costs of each network and the transport and agricultural benefits which would be generated over a 21 year period.

(iv) Estimating the construction and operating costs of the irrigation scheme and the agricultural benefits which would be generated and

(v) then separately ranking road projects and irrigation projects according to their Internal Rates of Return (IRR).

Rather than studying individual road links using this methodology, the Province was divided into four geographical regions: Baganian, Northern, Sibuguey and Western. Within each region, several road networks of increasing complexity were identified for study. The most complex combination involved the construction of 628 km of road. After ranking the networks by IRR, a 357 km programme was recommended. This fitted in with the construction capacity of the project equipment, but excluded all roads showing an IRR less than 12%.

Agricultural benefits proved to be critically important in the economic justification for a road link. Only one road link out of the dozens studied showed an IRR above 12% on the basis of transport benefits alone. This was the National Highway short-cut from Labangan to Molave.

Estimation of transport benefits from roads involved predictions about increases in traffic diverted from coastal pump-boats and traffic generated by increased agricultural activity, improved access, and population increases. The population studies had to cover birth, death and migration rates, since the population of Zamboanga del Sur had increased dramatically after 1950 by internal migration from the Central Philippines.

Similarly, estimation of agricultural benefits involved predictions over 21 years to 1996 WITH and WITHOUT the project. Present level use was studied and projected forward on a without-roads basis. Then the impact of project roads, plus project research and extension was estimated to give the with-road result over 21 years. The sum of incremental production increases and transport cost savings constituted total project benefit.

The two major assumptions underlying the agricultural benefit estimates were that a relatively low standard of all-weather road was sufficient to generate the benefits and that commercial services and government agricultural workers tend to be confined to road corridors.

In addition to the road construction programme, the 1975 study produced an irrigation design for the Sibuguey Valley and a village well-drilling programme.

Five agricultural extension programmes were recommended:

(1) Water management training in the Salug, Labangan and Sibuguey Valleys.

(2) Assistance to the Philippine Coconut Authority (PCA), in the establishment of a Module Farm at La Victoria.

(3) Assistance to the Bureau of Animal Industry (BAI) in the establishment of a livestock breeding station.

(4) Assistance to the Bureau of Plant Industry (BPI) with the breeding and distribution of better maize and sorghum varieties and

(5) assistance to the Ministry of Agriculture (MA) generally in the development of it's farmer extension services.

During the 1975 study, a baseline sociological survey was designed. A team of interviewers conducted the survey in early 1976, and the analysed results were published in 1977 (PADAP 1977). The survey established the pre-project situation across the Province in such areas as population, perceived problems, access to basic needs, income and its distribution.

OUTCOME

1. The Road Network 1975 to 1983.

During 1975 a 64 ha project compound was developed at Dao on a hill 3 km inland from Pagadian City. In addition to houses and barracks for Australian and Filipino staff, the compound contains a large workshop, concrete pipe factory, soils laboratory and administration block.

By February 1976 a large construction unit was operating out of the Dao centre. The construction equipment included 14 crawler tractors, 5 scrapers, 6 front-end loaders, 5 road graders, 50 dump trucks, 20 other trucks, 35 staff vehicles and a range of small equipment. The workforce consisted of 27 Australians, 31 professional Filipinos and 1110 Filipino clerks, operators, drivers, mechanics, carpenters, watchmen and labourers.

By the end of Phase 1 in December 1980, 253 km of project roads had been constructed, including 107 km of bitumen sealed road. The trunk roads and feeder roads in the Baganian and Sibuguey regions were largely completed. Nothing had been done in the Western region and much of the network planned for the Northern region remained to be built.

Phase II from 1981 to late 1983 has seen another 110 km constructed including the completion of the Baganian and Sibuguey networks. The Northern network is now nearing completion and work has commenced in the Western region.

The pace of construction has slowed since January 1981 when Phase II commenced because the project undertook the maintenance of previously constructed roads and began assisting the Provincial Engineer's Office (PEO) and Ministry of Public Works and Highways (MPWH) district office to maintain all other roads within the Province.

While traffic flows on new roads in some districts have approximated those predicted in the 1975 study, others are less. Traffic flows and savings in transport costs are discussed in Chapter 31.

2. The Sibuguey Irrigation Project 1975 to 1983.

Following investigation and design, construction commenced on this gravity system in December 1978 and irrigation was provided to the first groups of farms one year later. Australian technical assistance was phased out during the third quarter of 1983 with NIA being able to complete final development of the 3,500 hectares during the 1983/84 dry season.

The complexity of this project is the result of the need to augment the flow of the Dipili River, the long narrow shape of the irrigable area and the requirement for major flood protection and drainage works. Water is diverted from the Sibuguey River by a low weir, conveyed three kilometres and discharged upstream of a similar low weir and off intake structure, built on the Dipili River, to divert the combined flow to a desilting basin before entering the canal system.

The distribution system is based on fifty hectare tertiary units which consist of five quaternary blocks each with its own supply ditch and farm drain. Construction of tertiary and quaternary development and most of the drainage system has been carried out by manual labour while heavy equipment was used for major earthworks and roads.

To protect a large part of the project from floods it has been necessary to construct twenty six kilometres of levees and eleven floodgates. These prevent the Sibuguey, Buyugan and Balagon Rivers from inundating the area between Sampoli and Luup while still allowing drainage water to enter these rivers.

Some of the main irrigation canals pass through areas of peat. This has presented special construction problems. At several locations the irrigation water is conveyed under major streams via syphons.

By the end of 1983 all the headworks and 90% of the canal/road/drainage system had been completed servicing 2700 hectares of paddy.

3. Village Water Supply Development.

Many villages in the Province lack a reliable source of potable water. A 1977 study by a hydrogeologist concluded that a drilling programme should succeed in developing wells in both volcanic and alluvial bedrocks.

The rural water supply programme commenced in Phase I with a single Atlas Copco, pneumatic drilling rig but was expanded in ZDSDP Phase II following a survey of barangays in early 1982. Of the 931 barangays surveyed, only 202 had developed potable water sources. Of the remaining 729 barangays, 426 obtained their water from shallow wells or rivers and 303 from natural springs. Many of these sources dried up during the dry season, forcing the people to walk long distances to fetch water.

The expanded programme was developed with the District Office of MPWH to include 3 mechanical drilling rigs and 3 manually operated drilling rigs. A success rate of over 80% has been achieved on holes drilled and successful deep wells are now fitted with force pumps activated by UNICEF type pump heads in lieu of the early concrete and wooden handles. Shallow wells are fitted with 'Jetmatic' lift pumps of local manufacture.

A spring development programme was commenced to take advantage of the many natural all season springs. Most of these are developed by gravity flow through pipelines to faucets in the barrios however, pumping is required in some instances using low cost hydraulic rams or electric pumps feeding low cost ferro cement reservoirs.

By late 1983, the total accomplishment of Phase I and II was 218 successful wells and 54 spring developments servicing more than 250,000 people.

4. Early Agricultural Projects.

When ADAB reviewed the recommendations of the 1975 design study, the proposal to cooperate with the BPI on breeding maize and sorghum varieties was rejected on the grounds that the Project should avoid agricultural research and concentrate solely on extension. As a result only one Australian livestock consultant was approved for appointment in 1976. He worked largely with the development of the livestock breeding station and partly with the PCA module farm.

By 1977 ADAB realised that the agricultural programme was seriously imbalanced with no cropping component, particularly since the major farm enterprise on small farms was lowland or upland cropping. One Australian production agronomist joined the staff in 1977. Working with the BPI and the Bureau of Agricultural Extension (BAEx), he developed the Multiple Cropping Project whose target group was small upland farmers.

In late 1977 evaluation of the project by a team from the University of New South Wales recommended further increases in assistance to the agricultural development programme (PADAP 1978). As a result, an Australian research agronomist arrived in 1978 and a general agriculturist in 1979.

5. Redirection of the Project in Phase II 1981 to 1985.

Late in 1979, a joint Australian/Filipino team reviewed progress of the project and planned a further 5 year Phase II. Two major themes for Phase II were emphasized in this study report (ZDSDP 1980).

(i) The project should concentrate more on delivering benefits to small upland farmers, as distinct from better-off owners of large farms and lowland farmers.

(ii) The project should ensure that all activities are satisfactorily institutionalized by 1985 so that project activities will continue after Australian withdrawal. This process was seen to involve a major effort in counterpart training, with progressive handover of project management to those Filipinos who will carry on the activities.

The first exhortation was in sympathy with a general desire among multilateral and bilateral aid donors, and within the Philippines government, to assist the poorer people. The theme underlies many of the subsequent Chapters in this publication. Although there has been some positive exclusion of large landowners from project programmes, the main strategy adopted in Phase II has been to avoid capital intensive technology e.g., the use of tractors, and to concentrate research, development and extension on farming practices appropriate to small farmers.

The call by the Phase II planning team to institutionalize the project activities of Phase I was largely focused on the sustainability of programmes and to leave behind a road maintenance capacity. By 1980, the autonomous project of Phase I had very little interaction with the PEO which normally maintains feeder roads. It was considered essential that the road maintenance capacity and capability of the PEO be developed and that the PEO should progressively take over the maintenance of project roads well before the end of Phase II. The institutionalisation of the several agricultural programmes is a complex issue which is developing in several ways.

6. Phase II Agricultural Projects from 1981 to 1985.

During 1981 the Australian agricultural staff increased to eleven. By 1984 this will have decreased to seven, and only four Australians will serve through to December 1985. The latter stages of Phase II will concentrate largely on farmer extension. This present publication reports progress to late 1983 on farmer problem identification, technology generation and proving in the following ZDSDP agricultural programmes:

The Multiple Cropping Programmes

- Farmer Monitoring
- Crop Research
- Upland Crop Credit Programme
- Hillside Farming
- Agroforestry
- Upland Crop Extension
- Agricultural Engineering

The Livestock Development Programme

- Pasture Development Programme
- Work Cattle
- Goats
- Chickens
- Pigs
- Freshwater Fish
- Feedmill

The Tree Crops Programme

- Rubber
- Coffee
- Cocoa

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INSTITUTIONALISATION OF THE ZDSDP PROGRAMS THE CONCEPT AND REALITY

Wayne J.K. Haslam - Executive Officer

Introduction

The first Phase of the Zamboanga del Sur Development Project, from 1974 until 1980, operated under a lead agency project office. Control was highly centralised with the various programs, particularly in the infrastructure sector, being identified, appraised and implemented with little or no input from, or references to the local offices of the various agencies of the Ministries.

The second Phase of the Project sought to extend and reinforce the accomplishments of the first Phase and complement them. This was to be achieved by increasingly involving various agencies responsible for the sector programs and assisting them to develop their capacity and capability to take over the ZDSDP programs and continue the development efforts in the Province.

Institutionalisation

This concept of realigning the project programs within the Provincial offices of the agencies was referred to as "institutionalisation". Concomminant with this process was the phased withdrawal of Australian assistance.

The Phase II term of reference stated -

The guidelines for Australian withdrawal is the principle of moving out of ZDSDP and not leaving a vacuum but a self-sustaining development effort which can continue under Philippine Government direction. This is the principle of institutionalisation and embodies the development planning argument that to achieve a self-sustaining development effort in the long term, project activities which are presently being undertaken by the ZDSDP, must be transferred within the responsible agencies of the Government of the Philippines.

To sustain program efforts during its transfer from the responsibility of one organisation to another implies a gradual process with the complete-cooperation of both organisations.

Institutionalisation is therefore a process implying the development within the various agencies of the capability of development administration as opposed to normal line agency administration.

The institutionalisation of ZDSDP could be described as being "the establishment of the organisation, management and environmental conditions necessary to enable the responsible institutions to accommodate those functions currently being performed by ZDSDP". (1)

Another view of institutionalisation is that it is "the process by which, through the instrument of organisation, new ideas and functions are integrated and fitted into developing societies, are accepted and acquire the capacity to sustain themselves, and in turn influence the larger environment in which they function".(2)

It is also construed as "the end state of institution building, and means that the organization and its innovations are accepted and supported by the external environment".

The Project Institutionalisation and Manpower Development (1) study hypothesised that:

(1) Institutionalisation of ZDSDP II is not really an end state of the institution building process. Rather, it is a process which should be integrated into the implementation of ZDSDP II and should proceed even after its completion in 1985 among the agencies which have absorbed transferred functions, responsibilities and resources.

(2) The criteria of institutionalisation namely: technical capacity, normative commitments, innovative thrust, environmental image and spread effect altogether may not be realized by 1985.

(3) Institution building seems to be the more appropriate word if ZDSDP II will help plan, structure and guide the cooperating agencies which will absorb, continue and protect the changes it has started, be they technological (construction methods, equipment repair techniques, multiple-cropping methods, goat raising, etc.), cultural (results and production orientations, deadline consciousness, job attitudes, working on Saturdays) or political (delegation of authority, redistribution of power).

(4) Institutionalisation (as implied in the ZDSDP's terms of reference could be effected in the cooperating agencies through (a) capability improvement, (b) transfer to the agencies of ZDSDP functions, responsibilities and resources, and (c) the design and implementation of a manpower development program - as major operational strategies of the concept and goes on to say that, in view of the foregoing premises, institutionalisation in the context of ZDSDP conditions can be defined as a process whereby a project nearing completion undertakes the systematic transfer of its functions, responsibilities and resources, induces structural as well as behavioural changes and and provides appropriate assistance and guidance to existing institutions which are expected to continue the project values and the technological, cultural and political changes started by the project.

Progress Towards Institutionalisation

By the end of 1983 with three years completed of the five year Phase II, the progress towards institutionalisation as defined in the last section was not great.

The major obstacle encountered to date is the difficulty in having current project programs recognised by the central offices of the agencies for inclusion in established national programs. This is essential if funding is to continue after 1985 and current contractual staff can be given permanent items. The majority of program employees are contractual and their positions will be coterminus with the withdrawal of foreign assistance in 1985. This is a problem in both infrastructure and agricultural programs threatening the employment of over 600 people. Without guaranteed funding support beyond 1985 any further attempts at institutionalisation are meaningless.

While some agencies have developed considerable capacity for technical work and have the other necessary attribute for a continuing effort after 1985, other bureaucratic problems within the agencies indicate little possible chance of success. The highly institutional nature of the agencies themselves prevent the dynamic and flexible approach essential in development administration. The bureaucracy and strict heirarchy within the local institutions, is at times almost feudal in nature.

Lack of delegation of authority combined with a top down approach to management stifles initiative and prevents efficient use of program resources. The highly institutionalised nature of the agencies themselves through the regional offices to central national offices results in a lack of local accountability by agency staff. This also creates problems at national interagency level.

Funding releases for programs often lose a percentage at both national and regional level without either office having included their requirements at the time of submission. ZDSDP has had difficulty in obtaining advice of budget releases from some regional and national agency offices.

Supposedly to overcome bureaucracy, most government agencies set up centralised project offices for foreign assisted projects thereby preventing the use of existing national funding as program counterpart funds. This has created separate organisations which cannot be absorbed into the provincial level structure virtually ensuring programs are coterminus with the withdrawal of foreign assistance.

In a pilot to overcome this last problem, the ZDSDP is assisting cooperating agencies in health and nutrition by adopting existing programs and assisting to coordinate efforts. Existing agency appropriation are used as the local counterpart and foreign assistance is given to bridge shortfalls and overcome unforseen problems in integration. This approach appears promising although necessarily slow to develop.

Despite these readily identifiable and significant problems most agency staff at high level are continually optimistic that the programs will continue after the withdrawal of Australian Assistance.

The coordinating functions of the Project office are being successfully institutionalised through the office of the Provincial Development Coordinator who is also deputy project director. However GOA funds are being used to provide additional staff to allow the provincial development staff (PDS) to manage both project and provincial affairs. The number of staff presently in the PDS are those considered necessary after 1985. The Province may need further assistance after 1985 to continue to coordinate agency efforts towards provincial development and to continue to operate ZDSDP if national agencies continue current ZDSDP programs. This assistance could be given from the integrated area development support fund of the national government.

Conclusions

Development projects should not be established in such a way that they need subsequent institutionalisation. In the same way that it is difficult to change traditional technology in communities it is difficult to change the established and entrenched bureaucracy of the agencies. It is the result of the latter that led to the creation of special project offices with considerable autonomy to avoid the bureaucracy.

At this late stage in ZDSDP there appears little possibility that the project programs will continue after 1985 due to institutional constraints within the agencies themselves. The Project will need to prepare and submit 1986 budgets by November of 1985, leaving less than one year to overcome these constraints.

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AGRICULTURAL RESOURCES OF ZAMBOANGA DEL SUR

John McAlpine - Agro-Climatologist

INTRODUCTION

The Province of Zamboanga del Sur is situated on the Southern fall of the mountain divide which forms the Western Peninsula of Mindanao Island. The Province covers an area of 7,400 square kilometres and is centred on latitude 8 degrees North and longitude 123 degrees East. It comprises mostly uplands and steeplands interspersed with scattered areas of alluvial and tidal lowlands.

During 1982/83, a land resource evaluation survey was made of the Province by the Philippine Bureau of Soils in conjunction with the Philippine Australian Development Assistance Programme (PADAP). The survey aimed to provide an inventory and evaluation of the resources of Zamboanga del Sur for agricultural and associated development. The results are to be published by the Bureau of Soils. This brief report summarises the results of the physical resource survey of the Province.

CLIMATE

The climate of Zamboanga del Sur is typical of the humid equatorial tropics exhibiting an equitable temperature regime with relatively high rainfall associated with a moderate seasonal range in precipitation.

The mean rainfall over most of the Province is around 2,700 mm rising to 3,500 mm in inland locations near the central mountain divide. Mean monthly rainfall is generally in excess of 300 mm during the wet season (May-Dec) and June exceeds 400 mm. During the dry season mean monthly falls are mostly in the range 50 to 150 mm except during March around the Pagadian City and Aurora plateau area where means can fall to 25 mm.

Rainfall variability around these mean conditions is not great. The station with the longest record (Kabasalan) has a coefficient of variation of annual rainfall of only 16%. Although rainfall records are short, they appear to indicate similar relative reliability in the seasonal occurrence of rain. Rainless periods in the dry season are usually only of 4 to 6 weeks duration. However, the drought which commenced in December 1982 lasted 22 weeks. This latter event is associated with abnormal temperatures in the Southern American El Nino current and is hopefully unique. There is some evidence that the perturbation of the El Nino may be longer lasting and if so, this will have considerable consequences for agricultural development in Zamboanga del Sur.

Mean monthly maximum temperatures for lowland stations are generally in the range 29 to 32 degrees centigrade with a minimum of 22 to 24 degrees centigrade and show only slight seasonal variation. The largest variability of temperature is associated with the diurnal range of between 5 to 10 degrees. Although no high altitude data is available mean temperatures can be expected to fall approximately 5 degrees for each increase of 1,000 m in elevation.

Ranges of other climatic elements are similar to those found elsewhere in the humid equatorial tropics. Annual open pan evaporation ranges from 1,600 mm to 1,900 mm and mean relative humidity is high at around 80%.

Climatic data can be usefully integrated for agricultural purposes for use of water balance accounting. Using PADAP bio data, the average annual pattern of soil moisture availability shows an excess of water during June and July giving rise to possible water-logging under less well drained soil conditions.

From August to November, soil moisture fluctuates but at no time falls to levels likely to reduce plant growth. From late December to March soil moisture decreases steadily and may in some years result in short periods of total soil moisture depletion. This situation continues until the wet season commences when soil moisture is recharged.

GEOLOGY, LANDFORM AND SOIL

A physiographic regional approach is used here to briefly outline the main physical resources of the Province as they relate to agricultural development. This approach is useful in areas where geology, landform and soils are closely associated or in particular where soil is developed insitu. In some areas of Zamboanga del Sur particularly in the North Eastern Quarter soil development has also resulted from deposition of volcanic ash and other pyroclastic material from Mount Malindang volcano in the North East corner of the Province. Depth of ash cover generally decreases with distance from the centre of volcanic activity. In addition, areas of less slope such as plateaus and lower volcanic footslopes have greater ash cover than those with higher slope where ash deposits have been subject to erosion. The major effect of volcanic ash is to give similar soil profiles on land forms of different geological origin. The main resource regions of the Province and their percentage areas are:

(1) TIDAL FLATS

6%. Associated with coastal lowlands, subject to total inundation with grey silty clays (hydraquents) covered by Nagro and Nepa. Landuse is restricted to fish pond development and in places conversion to fresh water status and subsequent rice production.

(2) ALLUVIAL LOWLANDS AND UPLAND ALLUVIAL VALLEYS AND PLAINS

10%. This region consists mostly of the major lowland riverine plains, subject to inundation and possessing yellow and brown light to medium clay and clay loams frequently poorly drained and of moderate fertility (tropofluvent and eutropepts). Landuse is dominantly rainfed and irrigated rice.

(3) PLATEAU SURFACES

2%. Throughout the Province plateau surfaces occur with slopes of usually less than 5%. These and the alluvial lowlands were the areas first exploited and possess deep red and red brown well structured clays (paleudult and andepts) overlayed with a shallow surface soil. They are of acid to strongly acid reaction and are of relatively low fertility. Landuse is predominantly coconut with intercropping.

(4) RAISED CORAL REEFS

8%. Found chiefly in the Southern peninsulas of the Province. These are mostly of low slope (5%) but in places are considerably steeper (to 30%). Soils are derived from limestone and are either shallow dark brown clays (eutropepts) or deep grey clays (haplustolls) of moderately low fertility and firm consistence. Landuse is rainfed rice on land of low slope and elsewhere corn, coconut, banana, grasses and shrubs.

(5) UPLANDS

24%. These are landforms of moderate slope and rely on a variety of lithologies. With undulating and rolling landscapes they have slopes generally ranging from 5% to 20%. They are subject to moderate erosion hazard and where parent material is basalt possess red brown and brown acid clays of moderate structure and low fertility (tropudalf and andepts). Landuse is predominantly intercropped coconut. Where parent material is of sedimentary origin soils are generally yellow brown poorly structured sandy clays of low to very low fertility. They tend to be less heavily used and are mostly cogon grassland with patches of crops.

(6) STEEPLANDS

50%. These landforms consist of rugged hills and mountains on various lithologies with slopes of over 20% and mostly greater than 30%. Soils tend to be stoney and shallow clays on steeper hillsides or moderately deep clays on lower slopes. Commonly they exhibit an acid reaction trend and are of low to very low fertility. This region is subject to severe erosion hazard and is very lightly used for agriculture.

CONSTRAINTS

The main physical constraints to agricultural development are concerned with slope and relief. 50% of the Province is steep land with severe erosion hazard and a further 30% has moderate erosion hazard. While soils in the uplands on lower slopes are of low fertility they have moderately good physical structure and offer reasonable potential for development.

A further constraint is the nature of the soils. Most of the physically attractive and accessible soils are variable charge-clays (Gillman, 1981). Under cultivation Organic Matter (OM) is rapidly consumed. The reduction in Cation Exchange Capacity (CEC) with declining OM is accompanied by an increase in acidity. Acid fertilisers contribute to a further lowering of pH. Thus loss of fertility expressed as decline in CEC in variable charge clays provides serious problems for farmers and researchers to develop stable systems of land use particularly with respect to maintenance of soil fertility.

REFERENCE

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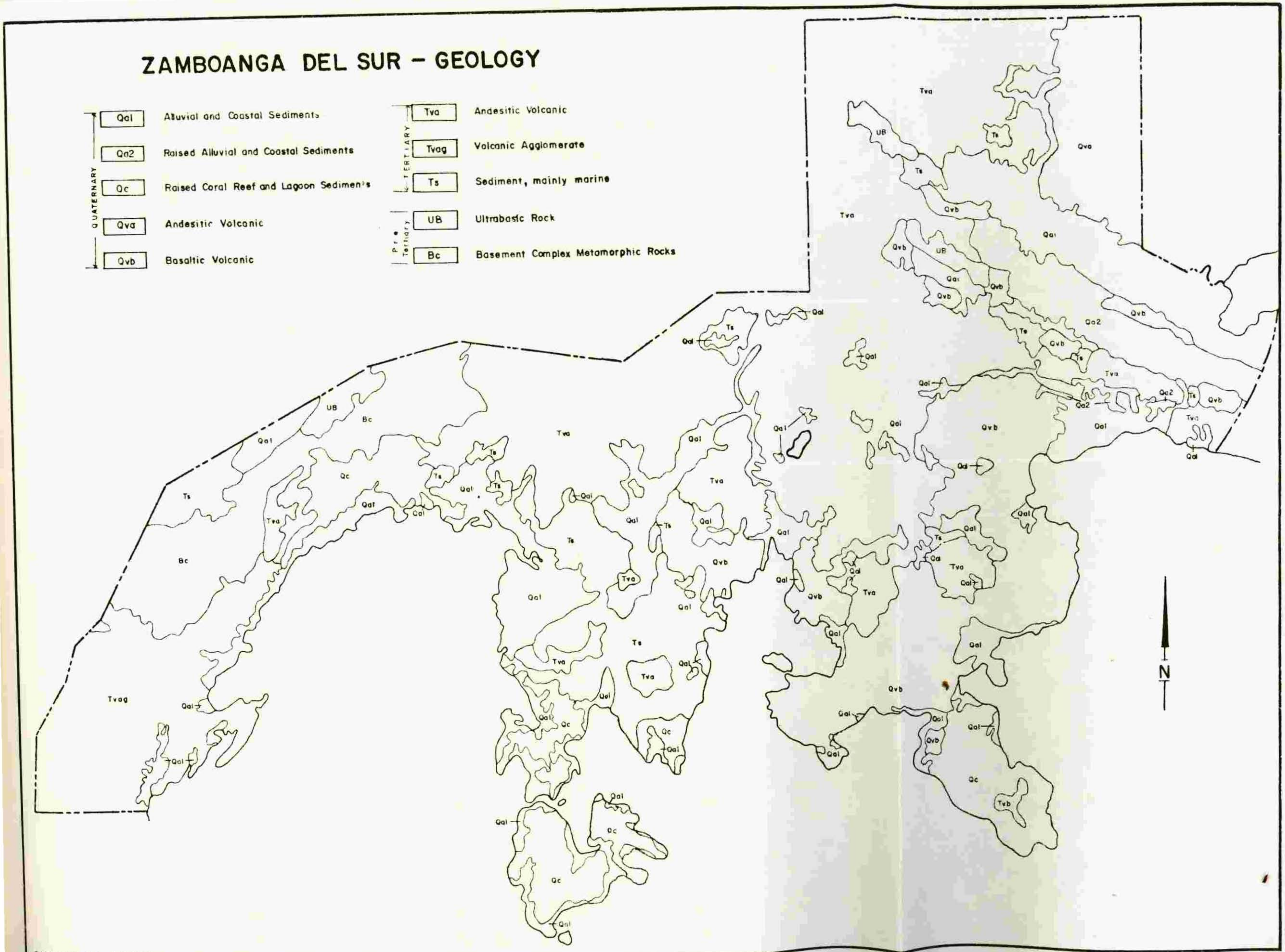
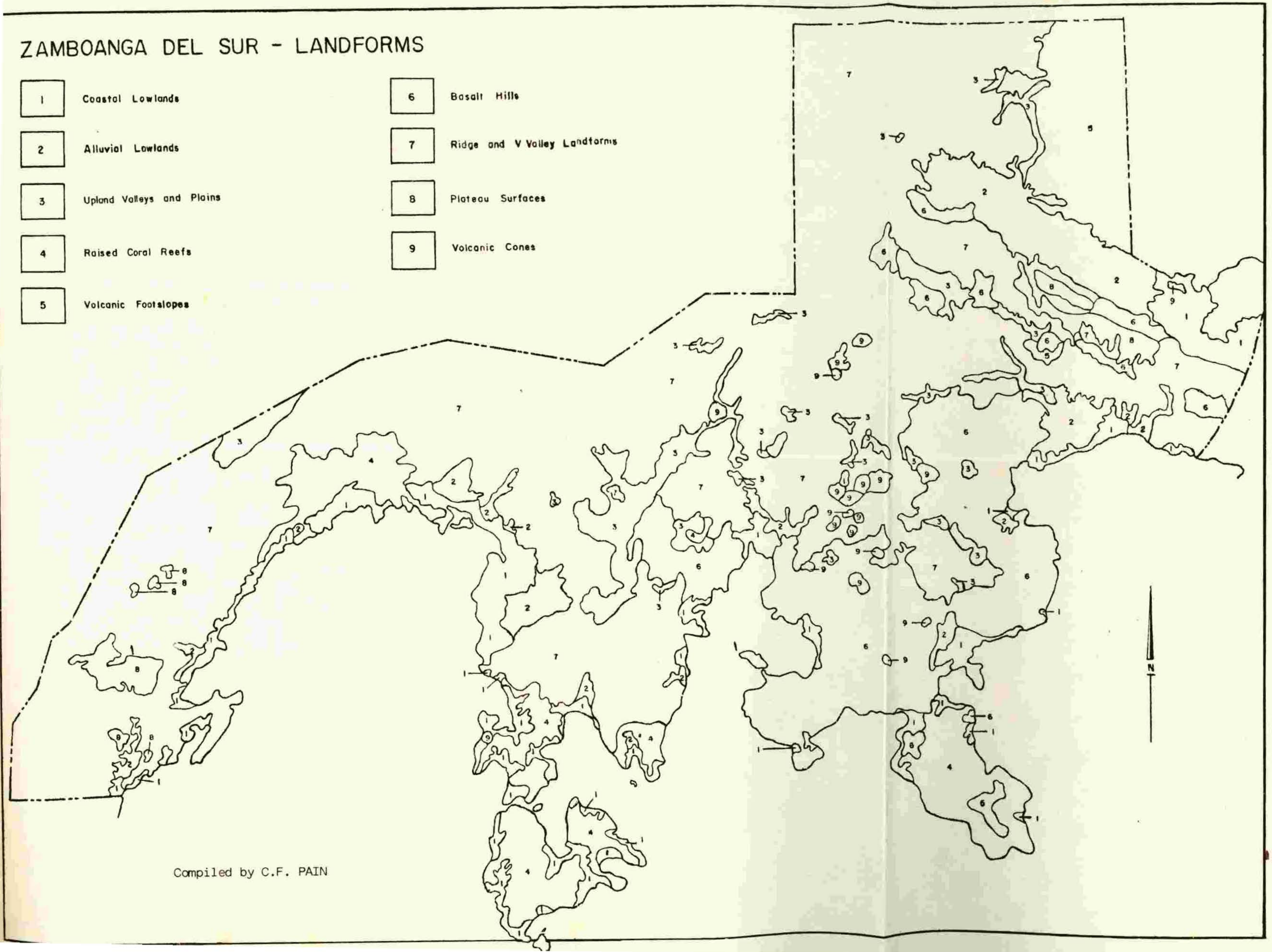
ZAMBOANGA DEL SUR – GEOLOGY


QUATERNARY
Qal Alluvial and Coastal Sediments
Qa2 Raised Alluvial and Coastal Sediments
Qc Raised Coral Reef and Lagoon Sediments
Qva Andesitic Volcanic
Qvb Basaltic Volcanic
TERTIARY
Tva Andesitic Volcanic
Tvag Volcanic Agglomerate
Ts Sediment, mainly marine
Pre Tertiary
UB Ultrabasic Rock
Bc Basement Complex Metamorphic Rocks
N

COMPILED BY C F PAIN

ZAMBOANGA DEL SUR - LANDFORMS



Compiled by C.F. PAIN

UPLAND FARMERS - A PROFILE

B. Trevor Ole - Agricultural Economist

INTRODUCTION

In designing agricultural development programmes it is necessary to consider not only the natural resources of the land but also the human resources. This paper attempts to give some insight into the socio-economic aspects of life in the Province of Zamboanga del Sur as well as an idea of the resource base of the upland farmers. By considering these aspects, together with the land resources, we can hopefully develop programmes which are not only feasible in terms of soil type, topography and climate but will also be both appropriate for and acceptable to the target population i.e. the upland farmers of the Province.

DEMOGRAPHY

1. Population Data

The Province has an estimated population of approximately 900,000. This population/age structure exhibits a very youthful pattern with approximately 45% of the population being aged from 0 to 14 years and 22% from 15 to 24. The very high percentage of young people implies that there will be a rapid expansion of the future work force which will require an increase in job opportunities and/or the intensification of agriculture just to keep pace with this growth. The youthfulness of the population also indicates the huge demand for services for children in the area, especially health and education services. (IPC Sociological Survey, 1982).*

Table 1 shows the Provincial Census data from 1960 to 1981. The high growth rates between 1960 and 1970 resulted from the immigration of persons (mostly Christians from the Central Philippines) to the Province. The drop in the growth rate between 1970 and 1975 could be attributed to the unstable peace and order conditions and often open warfare which prevailed in parts of the Province especially during the period 1973 to 1975. The population growth rate after 1975 rose again to 2.5% per year which was more in line with the National population growth rate of 2.8% per year.

TABLE 1

Population Data - Zamboanga del Sur

YEAR	1960	1970	1975	1980	1983*
POPULATION	455,203	690,288	737,829	834,425	898,271
PERCENTAGE INCREASE (%)		51.6	6.9	13.1	
ANNUAL GROWTH RATE (%)		4.3	1.3	2.5	

* 1983 figures were obtained by extrapolating from 1980 data using the annual growth rate from 1975 to 1980.

Source: National Census and Statistics Office

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*The Institute of Philippine Culture (IPC) carried out Sociological Surveys of the Province in 1976 and 1981. They were published in 1977 and 1982.

2. Mortality and Morbidity

Infections and nutritional diseases account for the majority of deaths in the Province. Diseases such as bronchitis, tuberculosis, pneumonia and gastro-enteritis are the most common. Death and severe illness are usually a result of poverty, malnutrition, poor nutrition, a lack of knowledge of nutrition and sanitation, environmental factors and lack of accessibility to medical attention and drugs. It is worth stressing that many of the deaths are caused by diseases for which the knowledge and technology to prevent or cure them is well known. Accidents and violence also account for a significant percentage of deaths in the region. This is an indication of the prevailing peace and order conditions in various parts of the Province.

Malnutrition is not listed as a major cause of death in the Provincial figures but it is apparent that it is the major underlying cause. The average per capita daily food intake in the South West Mindanao area is only 60% of the recommended allowance. There are indications that while the sheer bulk of food is adequate (cereal intake is above the recommended levels) the nutritional quality is well below acceptable levels. (IPC Sociological Survey, 1977).

Malnutrition also relates to a lack of energy for farmers to perform various cropping practices, which can seriously affect crop yields. Therefore any new practice which involves a higher labour input should be considered in terms of the farmer's ability to perform the tasks. Other family members are also affected, more so with the youngest children of larger families. This tends to occur because:

(i) The parents are forced to work longer hours to support the family and the mother is not able to continually breast feed her child during her absence and

(ii) more importance is placed on the older members of the family who are capable of working, resulting in less food being given to the young children or infants.

Recently malaria has re-emerged as a major disease in the Province. This has occurred because of the increased price of the petroleum based insecticides and a decrease in the operation of overall control measures from the local to the National level.

Schistosomiasis is an important disease in the lowland rice areas of the Province but control measures and farmer awareness programmes being undertaken by various Control Centres in the Province appear to be aiding its control.

3. Ethnic Groups

The original inhabitants of the Province were the Subanon people who practiced shifting agriculture in the interior of the Province long before Spanish colonial penetration began.

The Muslims also have a long established history in the Province. They have tended to congregate in coastal settlements and in many ways have remained separated from the predominantly Christian population through location, dress, language and cultural mannerisms.

While migration to other parts of Mindanao began in the early twentieth century, there was only a relatively low level of immigration to Zamboanga del Sur during this period. It was not until after World War II that Zamboanga del Sur became a major reception area. This was due to: -

(i) The growing pressure of population on land resources in the Visayas and Luzon.

(ii) The control of malaria and

(iii) the relative security of the area.

These migrants were mainly Visayan Christians (predominantly from Cebu) who now comprise almost 90 percent of the population.

Another aspect of this migration has been that the two original groups of inhabitants, the Subanons and the Muslims have now become minority groups within the Province and comprise approximately only 5% and 3% respectively of the population. They are now among the more disadvantaged of the Province and because of their separateness in terms of cultural mannerisms they represent definite target groupings.

AREA AND LAND USE

The total land area of the Province is approximately 736,000 hectares with around 43% of this area being farmed by 90,000 farmers. The following table gives the land use of the Province.

TABLE 2

Land Use - Zamboanga del Sur

Land Use	Area	Percentage of Total Area of Province (%)	Usual No. of Croppings per Year
Coconuts	136,000	18	perennial
Corn	72,000	10	2
Irrigated Lowland Rice	45,000	6	2
Rainfed Lowland Rice	13,000	2	1
Upland Rice	19,000	3	1
Rubber	14,000	2	perennial
Bananas and Vegetables	8,000	1	-
Cassava	5,000	0.5	1
Other Crops	4,000	0.5	-
Grassland	217,000	29	-
Shrubland	34,000	5	-
Forested Land	121,000	16	-
Wetland (mangroves, fishpond etc)	48,000	7	-
Total Provincial Land Area	736,000	100	

Source: Land Resources Evaluation Survey, Zamboanga del Sur (1983).

INCOMES

According to the IPC Sociological Survey (1981) the mean gross household income in Zamboanga del Sur for 1981 was ₱7,836.00. The median income was reported to be ₱4,295.00. These income figures include the value of commodities retained for home consumption. This survey covered both rural and urban households.

A report on rural poverty in the Philippines produced for the U.S. Agency for International Development (Hickey and Flammang, 1977) defined poverty for rural households as follows: - a rural household was considered poor if its total expenditure was less than a particular threshold level. In 1971, the threshold level for a household of six members was ₱5,000.00.

While it is not particularly relevant to merely index these amounts for inflation to 1981 it indicates that there exist very high levels of poverty in the Province especially since the 1981 median gross income is below the 1971 threshold expenditure level. This also helps explain how malnutrition underlies the causes of morbidity and mortality in the Province. Household members are forced to restrict their nutrient intakes because of higher prices for protein food sources than for cereals.

The IPC Sociological Survey (1982) revealed that household incomes were very unevenly distributed. This inequality is highlighted in Table 3 where it can be seen that 10% of the population had 42% of the total income. This inequality had increased from 1976 to 1981.

It is to be hoped that the agricultural programmes, which are aimed at the small farmer, will allow these persons to increase their incomes and avail of the social benefits made available through the roads. So even if the rich do get richer, it is expected that this will not be fully at the expense of the poorer members who will also be beneficiaries of development in terms of their economic and social welfare.

TABLE 3

Households in Zamboanga del Sur ranked according to annual household income, by selected statistical measures and cumulative share of total income in 1981.

Income Class	Mean Income (1) (₱)	Standard Deviation (₱)	Coefficient (2) of Variation (%)	Cumulative Share (%)
Lowest Decile	887	332	37.4	1.0
Second Decile	1787	204	11.4	3.0
Third Decile	2514	223	8.9	5.8
Fourth Decile	3411	318	9.3	9.6
Fifth "	4545	381	8.4	14.6
Sixth "	5844	439	7.5	21.1
Seventh "	7691	601	7.8	29.6
Eight "	10330	997	9.6	41.0
Ninth "	15438	2105	13.6	58.2
Highest "	37638	36230	96.3	100.0
Gini Ratio (3)	0.53			

No. of Sample Households = 1,283

Source: Sociological Survey Data, Institute of Philippine Culture, 1982.

(1) Mean income refers to the average annual gross income per household.

(2) Coefficient of Variation equals the [(standard deviation/mean) x 100].

(3) The Gini Ratio relates to the Lorenz Curve of Income Distribution and refers to the proportion of space between the 45 degree diagonal and the Lorenz Curve. The diagonal represents complete equality and a Gini Ratio of zero. The higher the Gini Ratio, the higher the inequality.

NOTE: As the agricultural programmes of ZDSDP are targeted towards the farmers in upland areas, the following sections of the paper will be concerned with upland farmers only and cannot be extrapolated to apply to lowland farmers.

UPLAND FARMS

FARM SIZE & LAND TENURE

In the Province of Zamboanga del Sur approximately 85% of the population lives in rural areas. In these rural areas almost all of the household heads are involved in farming. Only a small percentage, 2% are considered as agricultural workers or landless labourers (IPC Sociological Survey, 1982). Thus the Province does not have a large proporton of the workforce merely dependent on farm labouring work but the labour supply is available from neighbouring farmers especially at times of land preparation, weeding and harvesting.

The average farm size for upland farmers is approximately 3 ha with a median farm area of 2 ha. The distribution of farm area (Table 4) shows that more than 60 percent of farms are less than 3 ha. The farms in the upland tend to be in complete contiguous units with only a small percentage comprising more than one parcel.

TABLE 4

Percentage of Farms ranked According to Farm Area.

- Comparison of 1971 Census Data and Multiple Cropping Production Programmes (MCPP) Data.

	Distribution of Farm Areas (ha)				
Data Source	0-1.	1.01-3	3.01-5	5.01-10	10.1+
1971 Census (1) (%)	3	45	31	14	7
MCPP (1982) (%)	24	47	16	8	5

(1) The 1971 Census covered all farms in Zamboanga del Sur.

NOTE: Many farms were divided into smaller units for inheritance of sons and daughters and this accounts for differences between the data from 1971 to 1982.

Approximately 55% of farmers are owner/operators, 10% part owners, 30% share croppers and 5% tenants under cash rental arrangements. There has been a decrease in the number of owner/operators over the last 10 years which may be due to the peace and order situation and the resulting migration of landowners into cities leaving the farms to be operated by tenants.

The most common annual crop sharing arrangement is for the farmer to give one quarter of the net harvest to the landlord. The net figure is obtained after deducting input costs and harvesters' share. The arrangements for tenant farmers under coconuts vary greatly depending on the work to be performed by the tenant. The tenant who tends the coconuts and does the harvesting and processing into copra usually gets a one third share of the harvest (net of any extra labour costs for hired helpers at harvesting and copra making times).

Tenants are usually permitted to grow annual crops under the coconuts and are not required to give a share to the landowner. Crop sharing arrangements for all tenancy situations are set by the Ministry of Agrarian Reform but a variety of arrangements still prevail in rural areas.

An analysis of the data from Multiple Cropping Production Programme Cooperators has shown that the average farm size for owner/operators is significantly greater than that for share croppers. This implies that the land owning farmers are better off financially because they:

(i) Operate a larger farm area with a potentially higher total output and

(ii) do not have to give a share to a landlord.

The sharecroppers are also constrained in their adoption of technology and would tend not to plant long term perennial crops such as cacao and coffee because of insecurity of tenure. A further constraint is the unwillingness of the landlord to permit the tenant to engage in extra activities or different management practices especially if the land concerned is under coconuts.

LAND USE

The traditional farming system could generally be considered to consist of coconuts with a corn - corn cropping pattern and small areas of other minor crops. However, there has been a reduction in those farmers relying on corn through substitution of upland rice and legumes for corn. If we consider that corn is the major staple for the majority of upland farmers then this has been a major change. Indeed the decision to grow and sell the higher value rice and legume crops and then buy and eat the lower value corn crop is a very logical one.

Land use systems in the upland can be classified according to the following characteristics: soil type, slope, coconut upland, open upland and rainfed lowland. These factors can vary throughout a particular area and also on any particular farm. Imposed upon these are the characteristics of vehicle access (wet/dry season) and land tenure. All of these characteristics can be used to classify the areas of the Province according to the Recommendation Domain Methodology (Collinson, 1977). For each of these domains, certain recommendations on land use and cropping systems can be made which are appropriate for farmers.

Table 5 gives the Land Use per farm based on data collected from Multiple Cropping Cooperators. These cooperators, when compared to the total farm population are typical in terms of land tenure, farm size and general household and sociological conditions. However, they may tend to be atypical in terms of the crops grown, input use and access to agri-business infrastructure. The cooperators would also tend to be more involved in a cash/subsistence economy than the remainder of the upland farmers, especially those with limited access (far from road system), who could be considered to be more barter/subsistence oriented.

TABLE 5

Average Land Use per Farm for ZDSDP Multiple Cropping Cooperators

Land Use	Area	
Corn	1.0	
Lowland Rice	0.1	
Upland Rice)	0.6	First cropping only
Legumes)		First & Second cropping
Coconuts	1.3	
Other Crops/Vegetables/Tree Crops	0.1	
Other Land	0.5	
Less Coconut Area intercropped	0.6	
Total Farm Area	3.0	

The year is split basically into two cropping phases. The first cropping involves planting after the initial rains of the wet season in April or May, while planting for the second cropping takes place in September or October.

For many farmers, land use differs between the two croppings in that both improved and traditional rice varieties are grown in the first cropping but cannot be grown in the second cropping. This is due to the length of the growing season for rice and the duration of the wet season. Therefore grain legumes usually mungbean, peanut or soybean replace rice in the second cropping. A small area of grain legume is also usually grown in the first cropping.

In the second cropping there is less land devoted to annual crops. The shorter turn around time for land preparation means that the farmer does not have sufficient time to prepare his full land area. Thus the area of idle land (other land) is larger in the second cropping. The presence of this idle land indicates that increased productivity is not constrained by land but by:

(i) The availability and amount of farm family labour to work the land.

(ii) By the shortage of cash to hire labourers when there is not enough family labour to fully utilise the resources of the farm.

Coconuts are also an important aspect of the farming system. A proportion of coconut farmers are also intercropping coconuts with both annual and perennial crops. The pressure to intercrop coconuts increased greatly with the slump in copra prices.

THE FARMING SYSTEM

For most upland farmers, their farm operations are concerned mainly with corn in both the first and second cropping. This corn crop provides the staple for the farmer and his family with any "extra" amount being sold.

If we consider that farmers are basically risk averse, then once a farmer has an area set aside for his staple food supply, he is more willing to "experiment" with new crops and technologies. However, once his proficiency and experience with these new crops and practices increases, then he becomes less reliant on his basic food supply and can generate enough cash to satisfy his food requirements and have a greater cash surplus.

This security/income goal is very dependent on farm size. If the farm area is small or the crop productivity of the farm is low then a farmer will move further into off-farm income sources to generate income sufficient for his needs.

Rice would be considered as the second staple of these farmers. While rice is usually the preferred food in terms of taste, corn is preferred as a "working" food in that it gives a longer lasting feeling of fulfillment. However, due to the higher profitability of rice, the area of upland rice (both improved and native varieties) is increasing in the Province. The production of the traditional aromatic and glutinous rice varieties is also an important aspect for many farmers.

In addition to rice and corn crops, farmers grow a wide variety of other annual crops such as, cassava, camote (sweet potato), mungbean, peanut, soybean, ginger, garlic and tobacco. Small areas of vegetables are also common in upland areas with most farmers having very small backyard gardens with a few vegetables. However, these are only usually present in the wet season and very few are seen in the dry season.

Coconuts are the major tree crop in the Province and are important in the farming system because of their regular cash flow (four harvests per year) and the low labour input. At present many coconut farms also have a few cacao or coffee trees. Because of their shade requirement in the early growth stages, these crops are ideally suited for intercropping under coconuts. At present the cacao and coffee trees supply family needs or generate a small cash surplus. Fruit trees are also very common in the upland areas and are mainly used for home consumption.

Livestock are a means of diversifying farm income and allow for an investment of capital on the farm which can then be turned readily into cash for purchasing crop inputs, for emergency requirements or for daily expenditure As carabao or cattle they represent a means of livelihood for the cultivation of crops, the major source of income and/or food supply for upland farmers.

Details of livestock ownership for the upland farmers of the Province are given in Table 6.

TABLE 6

Percentage of Upland Households Owning Livestock and Average Number of Livestock Owned per Livestock Owner* in Zamboanga del Sur.

Livestock	Percentage of Households Owning Livestock (%)	Average Number Owned (No.)
Carabaos	63	1.7
Horses	17	1.4
Cattle	10	2.1
Pigs	67	2.4
Goats	16	2.3
Fowls	89	16.2

* This referred to owners by individual livestock type (e.g. for carabao, it was the average number of carabaos owned per carabao owner).

Source: Synnot, (1978).

Carabaos are used for draught and hauling purposes.

Horses are used for hauling.

Cattle are used almost exclusively for breeding purposes.

Pigs are raised as an income supplement and are rarely used for home consumption except for fiestas or celebrations. They are usually tethered and are kept under the house or in a small shelter. They are fed with rice or corn bran, cooked banana stems, ipil-ipil leaves and other leafy materials.

Goats are also used primarily as an income supplement. They are allowed to range free and feed on native grasses in the area.

Fowls also represent an easily liquifiable asset and are relatively easy to manage. They are usually fed some grains, by products and waste and are left to scavenge their remaining food.

Tree crops are a further source of diversification and together with livestock are a means of increasing annual income and decreasing the overall risks associated with annual cropping systems. They are also a means of spreading the labour input requirements through the year and while the annual cropping income peaks are still present, the cash flow is spread over more of the year and the liquifiable asset of livestock is present for emergencies.

FARMER PROBLEMS

The major problems concerning the people of the Province as detailed by the 1982 Sociological Survey include: -

(i) Lack of facilities i.e. health centers and personnel, schools and teachers, recreation centers, markets, and prime commodities.

(ii) Limited access and lack of transportation.

(iii) Difficulty in obtaining a potable water supply. At present people have inadequate supplies and unsanitary conditions at the existing water point.

The extent of road networks in the Province has greatly improved the accessibility of many people. However, the improved accessibility has increased the demand for services and facilities to such an extent that the desire for such facilities is perceived as a greater problem for more people than the desire for access.

In terms of direct farm related problems, it was found that low crop yields, declining productivity and the lack of draught power, implements and inputs were of serious concern to farmers. With the introduction of the ZDSDP agricultural programmes and implementation of the various projects, it was found that a constraint to the acceptance of certain technologies was based on the shortage of farm family labour needed for the increased labour input for crops, especially at weeding time. This is also related to the availability of cash to hire labour at the same time and the purchase of various inputs, materials and equipment.

This lack of cash is a major constraint to farmers in terms of self financing their own fertilizer purchases and also for the purchase of agricultural equipment such as pedal threshers and miniploughs. Farmers must also borrow money in order to buy food especially between the end of the dry season and the beginning of the first harvest. The money for these and other purposes comes from the following sources:

(i) Institutions (banks, credit unions etc.).

(ii) Businessmen/middlemen.

(iii) Family/friends.

(iv) Landowners (for tenant farmers).

Interest rates vary greatly and usually range from zero (family/friends) to 15 to 20% per month. Farmers who must borrow from the local usurers or businessmen and have to pay high interest rates, find it very difficult to extricate themselves from this debt cycle when after every harvest they find enough to pay the interest but have little or no cash available to repay the principal amount.

DATA SOURCES

The primary data sources for this compilation of a socio-economic profile of farmers came from the Institute of Philippine Culture Sociological Surveys, Zamboanga del Sur Agricultural Census, Multiple Cropping Farm Surveys (bi-annual) and Case Study Farmers. The Sociological Surveys examined the Province as a whole while the Multiple Cropping Farmer Surveys were directed towards those farmers involved in the ZDSDP Multiple Cropping Production Programme. The Case Study Farmers were selected from Agricultural Programme cooperators and a further five farmers who were not involved in ZDSDP Agricultural Programmes, were added as a control.

CONCLUSION

The agricultural programmes are dealing with small upland farmers who operate a reasonably diversified farming system. These farmers are operating with a fixed level of resources under a series of constraints and are attempting to satisfy a set of goals, namely:

1. Income goal.

Almost all farmers have the basic goal of increasing income. More basically this can be stated in terms of increasing production for home consumption. These farmers are operating under a severe cash constraint and the malnutrition constraint on labour input, both of which prohibit sudden changes to any higher income generating activities.

2. Security goal.

That is growing enough food for themselves and their family plus satisfying the other basic needs of life through the sale of any surplus.

3. Risk goal.

As the majority of farmers are balanced just above the subsistence level, any additional risk associated with the basic food supply cropping activity cannot be considered.

It is important that all of the aspects mentioned in this paper are kept in mind when we review the agricultural programmes of the ZDSDP and look at their appropriateness to and their acceptance by farmers.

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KEY CONCEPTS IN PROJECT METHODOLOGY

Ian Aberdeen - Agricultural Coordinator

It is difficult to list for others the many ideas which guided the development team into a particular set of project strategies and tactics. The concepts presented here are ones repeatedly discussed and refined at project management meetings. They have definitely influenced the agricultural projects and may prove helpful to other workers.

The Whole Farm Model.

Any project which sets out to genuinely benefit farmers must communicate and empathise with them. The Whole Farm Systems Model allows professional agriculturists to more quickly comprehend the resources, production methods and problems faced by individual farm families (Figure 1).

It is possible to draw versions of this model showing flows of money, biomass, information or whatever. The model has provided a useful checklist when designing farm questionnaires. It has helped researchers to predict what might prove appropriate technology for small farms and to understand why farmers have failed to adopt certain technologies. It is important to include both CASH and BARTER inputs and outputs in any attempt to model a small farm close to subsistence level.

The Agrisector Model.

It became obvious early in the Zamboanga del Sur Development Project (ZDSDP) that many of the constraints to agricultural production were outside the farm gate. In order to understand the nature and interaction of these constraints, it would be necessary to construct a much larger model than that of a single farm.

The General Model of the Agricultural Sector was developed to represent the major sub-systems of the sector, and the main features of the environment which influence and constrain agricultural development. The single "Whole Farm" remains at the centre of this Agrisector Model. The model has been adapted from that of Goldberg and McGinity (1979).

Figure 2 is only a skeletal representation of the sector system and its environment. It is possible to collect behind this master diagram, an album of diagrams representing each subsystem of the agrisector and the interactions between these subsystems.

Even this skeletal model allows some comparison between the agricultural sector of different regions and countries. Agriculture in Zamboanga del Sur, by comparison with the Australian agricultural sector, is deficient in the commodity flow chain, inputs and services, and in coordinating devices. There are also important features of the regional and national environment which constrain development. Clearly many changes would be required within and outside the local agricultural sector, before some types of modern agricultural production become possible. One of the themes in subsequent Chapters, is the extent to which the ZDSDP has attempted to influence these off-farm factors of production.

Figure 1. WHOLE FARM SYSTEMS MODEL

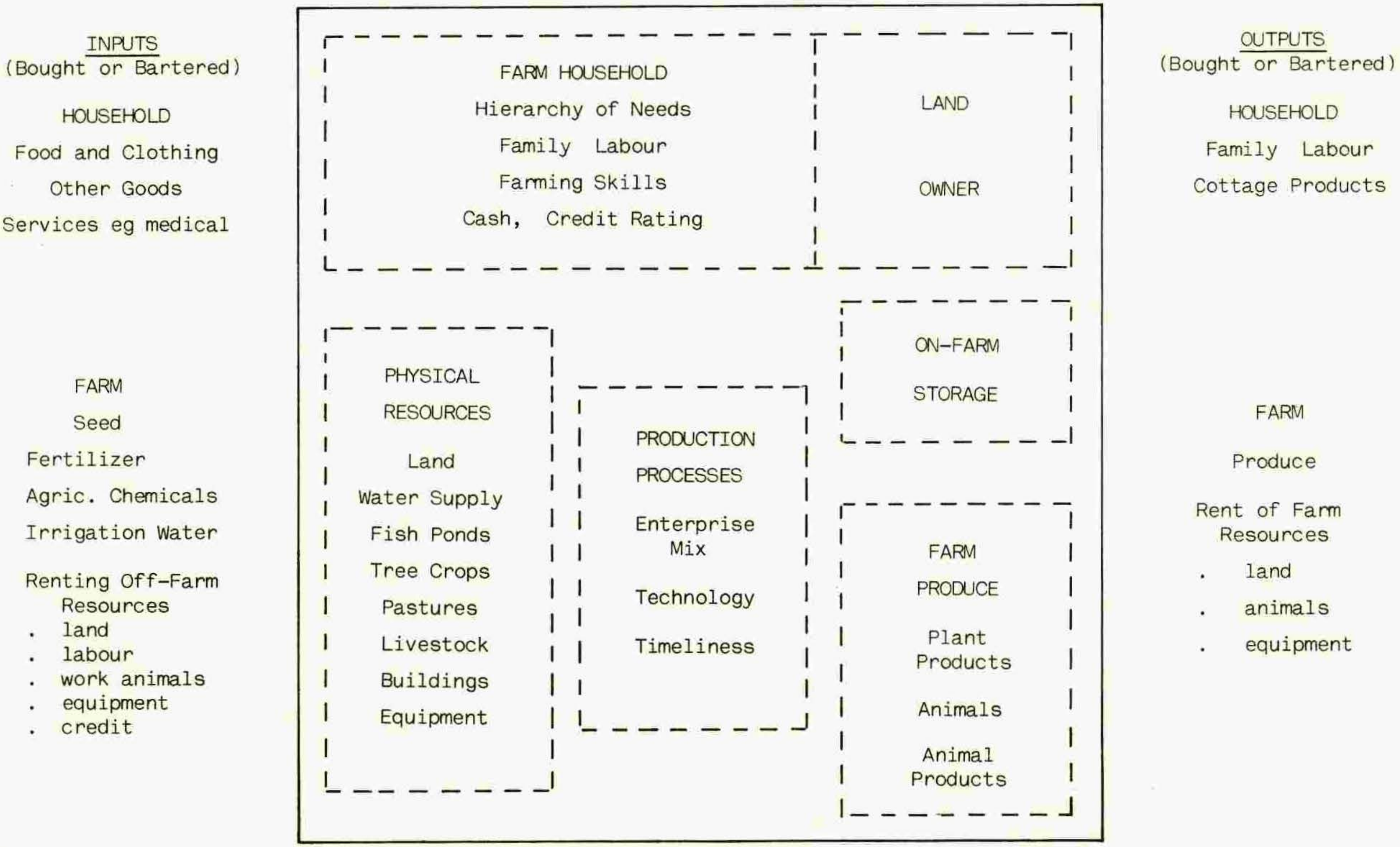
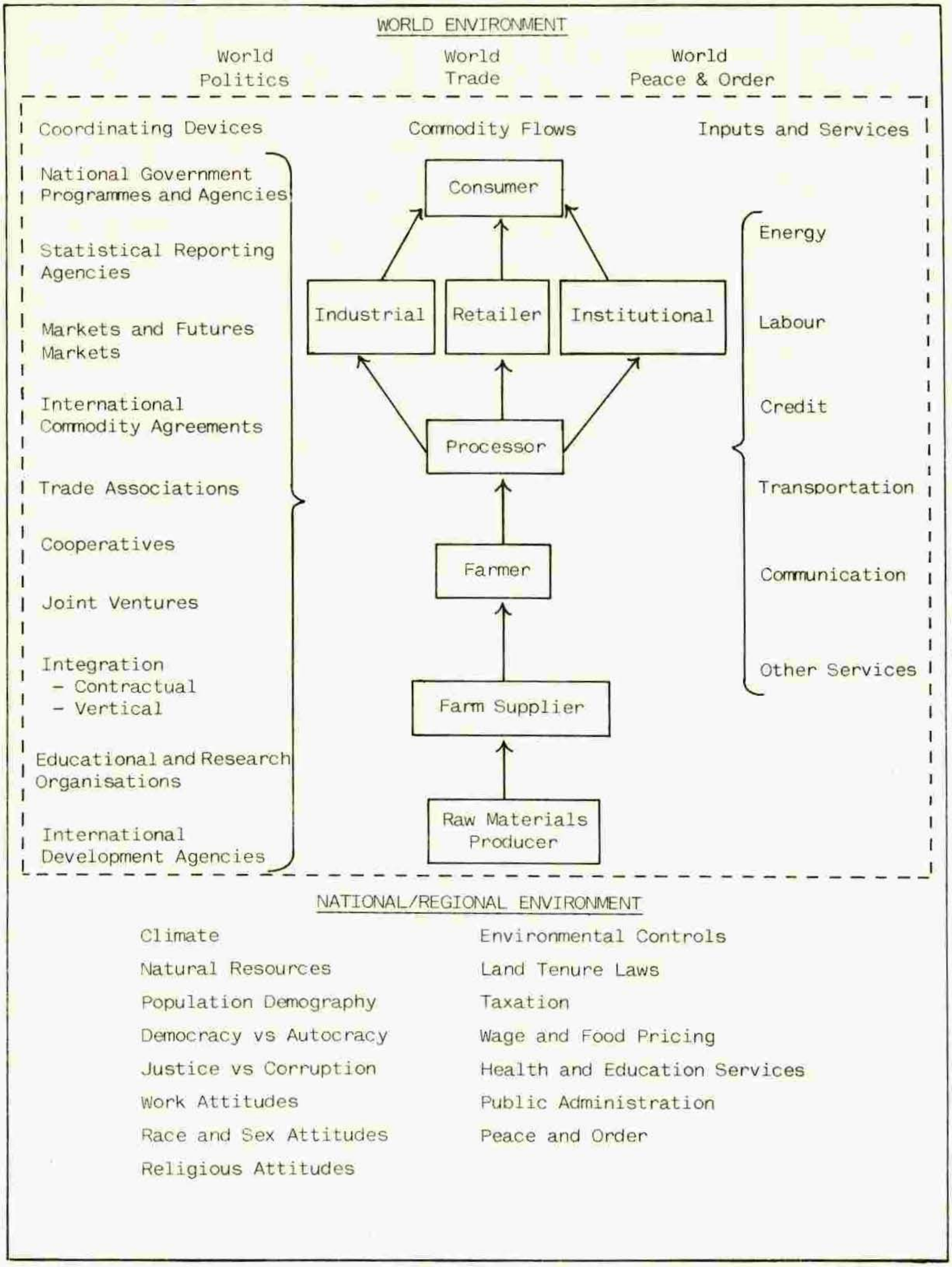


FIGURE 2
GENERAL MODEL OF AGRICULTURAL SECTOR



It is often suggested in development literature, that each country will evolve its own unique solutions to agricultural production. However, in this Province the agrisector improvements which ZDSDP has observed and sometimes assisted, tend to conform very closely to those in other places. The reason is that the constraints of biology and economics require that an efficient agriculture operate within fairly close limits (Douglas 1980).

The comparative study of agricultural sectors in different countries, using the Agrisector Systems Model, appears to have considerable potential. It requires a multiple-discipline effort in both model development and use. It would almost certainly place in context the hunches of many development workers concerning what constrains agricultural development, and what must change before certain kinds of modern agriculture could succeed.

The Development Challenge.

Even a cursory study of agriculture in Zamboanga del Sur using the Whole Farm and Agrisector Models leads one quickly to these conclusions:

(i) The potential productivity of the Province is much higher than is presently achieved.

(ii) There are many constraints within and outside the agricultural sector subsystem, which will prevent that potential being achieved in the short to medium term.

(iii) The distribution of wealth between large and small landowners tends to be skewed more towards the large landowners, than occurs in western societies.

In a project such as ZDSDP, where growth in production and equitable distribution of benefits are given as the project goals, a real development challenge emerges. The Australians working in Zamboanga del Sur between 1976 and 1985, would state the challenge along these lines:

(a) We have only ten years to assist farmers to increase production and retain the benefits of that production.

(b) We must work through our counterparts in the government agencies to achieve this. These counterparts are poorly paid and have little access to vehicles.

(c) We know that most of our capital intensive modern agricultural practices will be inappropriate to the small farmers here, and if promoted would tend to redistribute wealth to large farms.

(d) We must ensure that any recommendations are technically sound, are relevant and result in production increases.

(e) We cannot accurately predict just which technologies small farmers are likely to adopt.

(f) We expect it will be necessary to attempt to change some government policies, and to promote the development of better commercial and government support services, before most of the modern agricultural options could succeed.

A Development Methodology

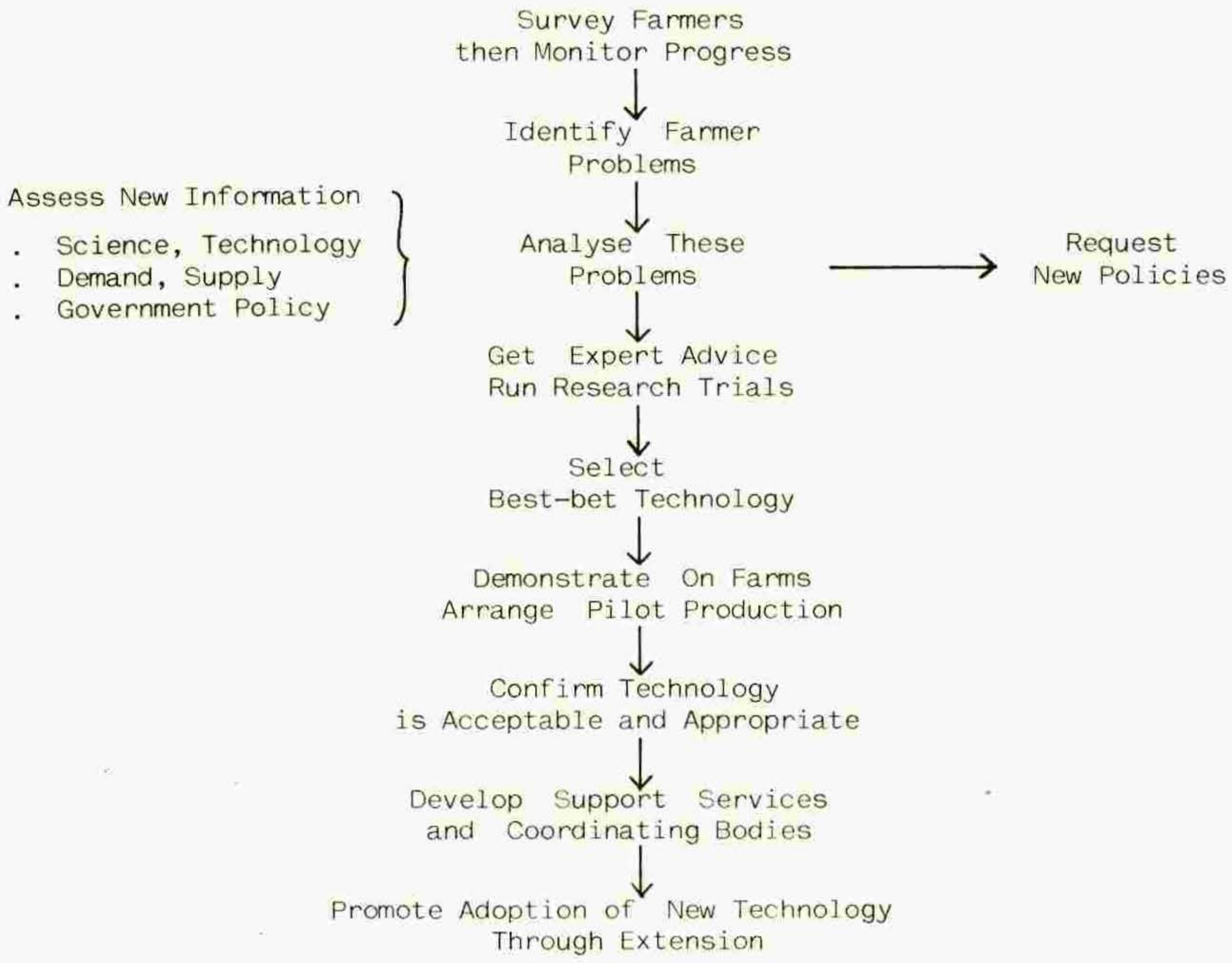
During the early years of the ZDSDP agricultural programmes, ZANDSTRA et al (1981), CIMMYT (1980) and others were discussing new methodologies for the management of agricultural research in developing countries. These methodologies pushed the role of the researcher well beyond the traditional research boundaries, but still fell short of a comprehensive methodology which might guide a major development activity such as ZDSDP.

It had already become obvious that the old research versus extension sequence said to be followed by agricultural teams took too limited a view of the development challenge. For a start there was small-plot research and farmer production proceeding concurrently in several ZDSDP agricultural projects. Secondly the logic sequence we followed was often iterative, repeating a define-problem, conduct-trial, test-with-farmer sequence several times, until something promising emerged.

With the concepts of the Whole Farm Model, the Agrisector Model, and the nature of the development challenge in mind, the methodologies from the literature were extended to that illustrated in Figure 3.

FIGURE 3

A METHODOLOGY FOR MANAGING AGRICULTURAL DEVELOPMENT



Because the methodology is inevitably iterative in whole or part, the diagram was first drawn in a circle. A multi-discipline team working through the methodology is often working concurrently on most of the logic steps at the same time.

However, the linear presentation of the methodology here does reasonably represent the major steps through which ZDSDP agricultural programmes will pass from 1976 to 1985. These are:

1. Problem Identification
2. Technology Generation
3. Technology Proving
4. Support Service Development
5. Mass Extension.

The development literature has many references to the need for identifying technology that is appropriate for use by small farmers. In the ZDSDP experience the greatest constraint lies in the support services. Even farmers with very little land are able and willing to adopt production systems which existing support services are incapable of sustaining.

Farmer Problem Identification.

It is popular in the 1980's to condemn planning from the top down, and to preach planning from the bottom-up. The implication is that farmers fully understand their on-farm and off-farm problems, and are ready waiting to prescribe the cures for these problems. Reality is different.

Development planning must certainly communicate with farmers from the beginning. The communication should include both single farm surveys and farmer-group discussions. The problems perceived by farmers are usually well observed but poorly explained. The agriculturist often has to interpret the problem as reported, before it can be expressed in a scientific form.

At this point the problem is usually referred to scientific experts, or subjected to small plot research, with little reference to the farmer. Once a best-bet technical solution emerges however, it is very important to involve the farmer again in the process of on-farm proving.

Influencing Government Policy.

The ZDSDP agricultural programmes have frequently been constrained by existing government policy. On a number of occasions project staff have made a presentation to government officials explaining the facts and mechanism of such a policy constraint. In some cases the policy has remained unchanged for one political reason or another. In other cases, the policy has been modified to remove the unintended constraint to development.

Provided that projects such as ZDSDP approach this problem factually and apolitically, such requests for policy change seem a desirable and acceptable activity.

Technology Generation and Proving.

Once farm production and equity problems have been identified and expressed in appropriate terms, solutions must be sought. Some solutions should be immediately available from project staff, drawing from scientific principles or from professional experience. Other solutions may come from visiting specialists, brought in to study the problem. In some cases it may prove desirable to conduct small-plot trials, where some factors are carefully controlled to better define the problem. Again small-plot trials may be conducted to test possible solutions.

Sometimes, no solution will emerge. When a likely technology is identified, it must then be proven effective on farms and acceptable to farmers. The proving of effectiveness is usually done on a small number of commercial farms, with a farmer managing the production, and researchers taking detailed measurement of the input/output results he achieves. Farmer acceptability can only be proven in longer trials involving some hundreds of cooperating farmers over several years. Input/output results must still be monitored but the most important observation becomes whether the farmer voluntarily continues the new practice. As explained in later Chapters, many farmers have failed to continue upland cropping using credit within the ZDSDP Multiple Cropping programme. In that and other cases, we have had to decide what level of farmer drop-out might reasonably occur with a new practice.

Institutionalisation Redefined.

The Phase II planning study promoted institutionalisation largely in the context of the government institutions. The concept was that the appropriate government line agency in the Province should, through training develop the capability to take over from the Australian/Filipino ZDSDP, all of the project functions. In this way, the several project programmes could continue uninterrupted beyond 1985. Experience to date has shown that this needs several qualifications.

1. Institutionalisation of the agricultural programmes is better seen in the context of the whole agricultural sector, especially when the project is required to concentrate its benefits with small farmers. The Agrisector Model clearly shows that government technicians in a Ministry of Agriculture are only one of many sector sub-systems and environment factors influencing farmers productivity and wealth.

An over-zealous campaign for institutionalisation in its narrow sense, can focus too much project effort into the institutions, and too little into benefiting the target group.

2. The scientific, technical and management skills which are assembled in a bilateral project, and the funds which are available to support their operation, are usually not available in normal line agency operation. Indeed it has been the motto in many Philippine situations, that "if you want to get something done, you need to arrange a special project with special staff and funding".

Faced with this real life situation, it is not always appropriate to train, campaign, and then hope that some project activities survive post-project. It is often better to make reasonable predictions about which staff, which programmes and what level of funds will survive, and to then concentrate institutionalisation effort in these areas.

The Logical Framework Matrix.

Since the late 1970's, ADAB have required Australian aid projects to be planned and monitored using the Logical Framework Matrix or Log-Frame(Imboden, 1980). The Phase II programmes of ZDSDP have all been represented in this format, and some reporting follows the format. The recent report of the ZDSDP mid-Phase II Review is oriented around these Log Frames. The great value of Log Frames is in providing a global logic to any particular programme, so that project plans and progress can be better assessed.

It seemed desirable to consolidate the logic of the iterative development methodology outlined above with that of the log-frame. Essentially the log steps in that methodology coincide with the major project outputs of a log-frame. More recently, ADAB have required that each project be represented by a network diagram. The milestones in such networks, representing the end of events would again seem to equate with project outputs in a log-frame.

Network Analysis.

The representation of an agricultural development programme in the form of a network diagram is a forbidding task.

It is clear that the agricultural development methodology above is sequential, and that the satisfactory conclusion of a step in the sequence represents a milestone. Frequently however, there is no previous experience from which to estimate the likely duration of that step, and some reiteration is expected. It is often difficult also to know just which events will prove to be dependent in some way.

At this stage of ZDSDP we have not succeeded in producing any worthwhile agricultural network diagrams, and nobody has shown much interest in monitoring agricultural progress via networks.

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ISSUES IN PROJECT DESIGN

Ian Aberdeen - Agricultural Coordinator

PROJECT PURPOSE AND TARGET BENEFICIARIES

The popular press in Australia has in recent years criticized the Zamboanga del Sur Development Project (ZDSDP) because they say it fails to benefit the poor and particularly the small tenant farmer of the Province. In many ways the criticism has been regarded by project management as spurious because it is emotional and lacks objective analysis.

Nevertheless, criticism has helped by emphasizing the importance of clearly defining project purpose and target beneficiaries in a logical framework context. It is well known that development projects often fail to reach the most needy. For this reason, in the design of Phase II, the defined purpose was to assist a target group and in agriculture, this was the upland farmer. Economic development was a concurrent and complementary objective. Thus, road construction and irrigation assist in general economic growth though roads per se are not discriminating in terms of a target group. They are there for all.

When purposes are refined at the upland farm level some specific problems have high priority. Thus, in economic terms, agriculture seeks to improve the lot of the upland farmer through growth, equity and stability.

(i) Growth - in agricultural terms this means providing new programmes for increased output without exploiting the natural resources.

(ii) Equity - the target group is the upland farmer on 1-4 hectares. He is either owner or tenant farmer. These are the majority of upland farmers and these are the participants.

(iii) Stability - growth must occur in the context of a stable system. This means land must have stable tenure arrangements and soil must have stability i.e. be protected from erosion.

ORGANISATION OF AN INTEGRATED AREA DEVELOPMENT PROJECT (IADP)

Coordination of the numerous engineering and agricultural programmes within the ZDSDP has always been difficult. In Phase II, the coordination role was undertaken by the National Council for Integrated Area Development (NACIAD).

In one sense, a series of development activities in the one area can be said to be integrated if they occur in the correct sequence and are complementary in effect e.g. road construction and agricultural extension. In that sense, there seems little need for close coordination of activity, given that the IADP was correctly designed in the first place. It has unfortunately been true that among the Australian and Filipino staff of the various ZDSDP projects, those working on one project had little knowledge of activities on other projects. Programmes were complementary but co-ordination at field level was not good.

The need for coordination of ZDSDP at a national level is proving to be very important because of budget implications. Since 1981, with programme funding being part of regular line agency budgets, NACIAD has found it necessary to involve Ministry of Budget Officers in budget planning to ensure that line agencies are allocated sufficient funds for the programmes.

The organisation charts for the ZDSDP, published in project documents going back to 1973, show an interesting evolution in the search for an IADP organisation appropriate for the circumstances of that time. The most important change has beer a move away from coordination at a national level to coordination within the Province. Now the local officials who are primarily responsible for managing the programmes are the ones who work together in Provincial IAD coordinating committees.

SELECTING THE PROJECT MODE

Although the Australian staff of ZDSDP have frequently been seen as advisors to line agency staff, the project has included a number of project modes, and Australians have performed in several different roles.

The road construction activity of Phase I was undertaken by an autonomous project responsible directly to a Manila project office with no formal and few informal links with local line agencies. It proved an efficient project mode for constructing a road network but the lack of interaction with the local Ministry of Public Highways (MPH) and Provincial Engineer's Office (PEO) staff prevented the Province from developing local line agency capability to similarly construct further roads, and most important, to maintain those constructed by ZDSDP.

The Sibuguey Valley Irrigation Project is different. From the beginning it has been a joint project between the National Irrigation Administration (NIA) and the ZDSDP autonomous construction unit. This project mode has kept the line agency closely involved, while providing a special project situation for expediting construction.

Agricultural projects began with staff employed by the autonomous ZDSDP project. All projects now have Filipino staff employed by the line agency, but assigned to agreed joint projects with Australians working within the ZDSDP. This was thought to be a satisfactory mode, for easy institutionalisation of the joint project activities. Two problems have emerged however.

1. Contractual Employment.

The Ministry of Agriculture (MA) and other line agencies have tended to assign additional staff, often new graduates, to the joint projects with ZDSDP. Most do not have security of tenure. They are contractual staff, likely to be dismissed when the line agency budget is cut back after the ZDSDP finishes in 1985. Although the skills acquired by them will remain generally available to the Philippines, their special skills in managing the joint agriculture programmes will not remain available to Zamboanga del Sur (ZdS).

2. National Programme Status.

Some of the special joint agriculture programmes have not yet become accepted as normal line agency programmes. This relates to the fact that they are new programmes which have evolved from experimentation within the Project. They must inevitably go through an appraisal period, before regional or national line agency heads decide they are appropriate to continue. In order to retain contractual staff either foreign assistance or National

Programme status is required. Otherwise the contract of employment is co-terminus with the conclusion of the project.

In the last two years of ZDSDP, a number of Australian staff will spend at least part of their time in purely advisory roles to line agencies and coordinating committees where ZDSDP has no control and provides no funds. Up until 1983 most Australian agricultural staff have operated in a joint-management role with their Filipino counterparts, supervising one of the joint projects. When each of these projects commenced, it was not unusual for the Australian to completely control and manage the activity for a few months while counterparts were assigned and given initial training.

Although even a low level of Australian control has been resented by some Filipinos at times, the maintenance of project achievement must be considered. As discussed in Chapter 3 premature institutionalisation may impair project effort from bringing benefit to the target group of small farmers.

INTERMITTENT FUND FLOWS

While Australian funding of the ZDSDP has always been available, there have been delays and shortfalls in GOP funds in most years. A most important reason for this has been the slow and inadequate supply of information to the Ministry of Finance. For more than a year the protracted decision by the GOA to fund a five year Phase II, prevented the project office from meeting deadlines for counterpart budget submissions. Then when Phase II got under way and GOP budget submissions were at least in part required to come from the line agencies rather than from the project office, it took a year or two to meet the new Ministry of Budget requirements.

There is no doubt that better communication and coordination between the GOA, line agencies and the project office could have reduced the extent of these problems.

On the Australian side, deficiencies in GOP funding have led to some ad hoc rescue financing to allow the project to operate at a caretaker level for days or weeks as, for example, when fuel supplies run out.

When Filipino staff salaries have remained unpaid for several months, the effect on morale has been quite severe. It has been necessary at times for university graduate counterparts to go off and take labourers jobs, in order to provide food for their families.

PROJECT STAFFING.

Over 100 Australians have worked at the ZDSDP since 1974. Most of them have performed well.

Some Filipino staff state they have found the turnover of Australian agricultural staff to be confusing and disruptive. They have requested that individuals' assignments be extended to avoid yet another change. Married staff are appointed on a two year contract, and many request a one year extension. Beyond that, most Australians wish to move to another position, and project management usually wish to bring in a person with different qualifications to undertake a later stage in the project cycle.

It has often been difficult to arrange for suitable Filipino counterpart staff to be appointed to new agricultural programmes. The multiple cropping research programme is a good example. There are few Mindanao born graduates with post-graduate degrees in applied research. Moreover, it is difficult to entice researchers from Manila because of low salary levels and the general problem of peace and order in ZdS.

There are two dimensions to this problem. In future, it is recommended that the GOA should request the GOP at the time of project design to give every assistance to appointing properly qualified staff and guaranteeing that they will be given permanent employment with the appropriate line agency. Where this is just not possible, the programme must either be dropped, or conducted as a necessary short-term activity with little prospect of institutionalisation.

PHASING OF PROJECT ACTIVITY

When drawing a network diagram of certain kinds of proposed project activities, some of the dependencies and therefore sequences are easily defined. Others such as those in the agricultural development methodology are less obvious and predictable because outcomes and events in biological systems are relatively unpredictable.

The proposed size and length of a project are important to efficient design and phasing. Phase I of ZDSDP proceeded with a definite expectation of a further phase. This expectation persisted through the 1979-1980 hiatus period. When Phase II began in January 1981, it was made very clear that ZDSDP was to terminate in December 1985. This has helped in the progressive phasing out of project based activity into a line agency mode in spite of the difficulty of successfully planning short term agricultural activities.

Changes in both Filipino and Australian funding levels have modified the planned phasing of construction activities. In the agricultural projects, phasing has been more dependent upon progress achieved in working through the development methodology than the funding. The influence of funding is seen mainly in the scale of the operation.

THE ROLE OF AGRICULTURAL RESEARCH

When the ZDSDP agricultural programmes began in 1976, most, if not all farmer recommendations were passed down from Manila. It became desirable to check some of these recommendations or to generate better ones in local trials. Frequently these trials were quite simple but they had a profound effect on the quality of farmer recommendations. For the first time it was possible to refer to research results from within ZdS.

Simpson (1982) and Stevens (1977) have emphasized the important role of local applied research in agricultural development. It can be a powerful dynamo lighting the way to more productive farming systems. Simpson argues that in the early stages of agricultural development, such research is much more important than extension. He says that farmers are able to apply the research results simply by observing demonstration plots spread around by the research team.

The ZDSDP agricultural programmes have experienced the same dilemma with research, as have other development projects. In spite of its importance, it is the most difficult programme to staff and has the least prospect for persisting after project completion. This suggests that one type of longer term sectoral aid could be the establishment of ongoing applied research activities in the major agro-climatic zones of the Philippines.

MONITORING AND EVALUATION

The development methodology used in the ZDSDP agricultural programmes involves technical, economic and social experimentation. Feed-back of results is essential to efficient operation. Much of this feedback flows from farmer cooperators through extension technicians to the programme managers. There remains a need for more formal and independent monitoring.

In 1981 an Australian agricultural economist was assigned to set up a Monitoring and Evaluation Cell in the Multiple Cropping Project. The work has taken two main streams. One stream has involved better definition of present land-use, following the earlier survey by Denning (1980). This information has been summarised in Chapter 2 "Upland Farmers". A second activity stream has focused on results obtained by cooperating farmers in the Crop Production Credit programme. This activity is reported in Chapter 30 "Measuring Farmer Benefits." Some hard lessons were learned about the necessity to reliably establish yields by measuring crop area, checking harvest reports with crop cuts, and sampling in strata.

Other programmes have suffered from a lack of similar monitoring, and it is proposed that that activity be expanded to monitor all ZDSDP programmes through the years 1984 and 1985. This will be done in association with the Provincial Development Staff and will undoubtedly create problems in allocation of staff and time. Smaller samples could lead to less reliable results but at least all projects will be subject to independent measurement. The important thing then will be for project management to sit down with each programme manager and discuss the findings in the context of the Log-Frame for that programme.

Within the Ministry of Agriculture, monitoring has been done by the Bureau of Agricultural Economics (BAECON). Little interaction occurs between BAECON and the various production programmes. If this interaction could be improved the agricultural monitoring activities of ZDSDP may best be institutionalised into BAECON.

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THE MULTIPLE CROPPING RESEARCH PROGRAMME

Harry J. Nesbitt - Research Agronomist

INTRODUCTION

The Zamboanga del Sur Development Project (ZDSDP), Multiple Cropping Project (MCP) was initially designed to operate using technology developed outside of the Province as it was considered that there was no need for an extensive research programme. The project identification and evaluation study drafted in November 1975 contained no formal proposal for a multiple cropping research programme but there was a suggestion that the agriculturalists should "delineate the necessary measures required for improved crop production" (PADAP 1975). The assumption was, that little change needed to be made to packages of technology developed in Luzon and at international institutions outside of the Philippines.

The need for localized research to support the production programme became very evident after two croppings (Second Cropping 1977 and First Cropping 1978) and suitable sites for a research station were investigated. Approximately eight hectares of land was purchased in 1978 at Betinan, San Miguel, Zamboanga del Sur (ZdS) for the purpose of providing a base from which research could be conducted. Research trials coordinated by the Multiple Cropping Research Programme (MCRP) section of MCP commenced at Betinan Research Station (BRS) in September 1978.

The agroclimatic conditions at Betinan are broadly representative of the Province. On this basis, evaluation of varieties, new crops and cropping-systems research is conducted on site. Other work which may vary with soil type or microclimate conditions is done on farmer's properties scattered throughout areas accessible to Betinan. Studies of this nature include fertilizer response experiments, crop protection investigations and farmer management trials.

OBJECTIVES OF THE PROGRAMME

The primary purpose of the research programme is to generate data on multiple cropping which is applicable for use in the agroclimatic conditions prevailing in the Province.

Other objectives were formulated as the research station became established as a permanent institution that was capable of generating high quality research data. BRS was included in the UPLB Regional Testing Network during 1980 for the evaluation of new varieties of corn and other cereals. Similar networks exist for evaluation of legumes, (Philippine Council for Agriculture and Resources, Research and Development, (PCARRD) and rice (International Rice Research Institute,IRRI). By integrating BRS into national evaluation programmes it is hoped that after ZDSDP terminates, the station will remain an entity and continue to provide high quality research results for use on a Provincial and national level.

The second objective was to develop BRS as an applied research and training centre for the Province. To meet this end a dormitory and seminar room were constructed for use by researchers, farmers, and technicians. It was also proposed that researchers should receive training in science and management disciplines to a point where BRS could function without external supervision.

EVOLUTION OF THE PROGRAMME

Initially emphasis was placed on the evaluation of the best varieties of a number of crops for cultivation in the Province. Much of the programme was also devoted to fertilizer response trials established on the three geologically predominant soil types in the Province.

The cropping patterns within the Province diversified from the traditional corn-corn and rice-corn rotations after information was gathered on new crops, new crop varieties and fertilizer recommendations for them. More legumes were grown, making it necessary to study cropping systems, including more sophisticated and intensified cultural management practices. During 1979 and 1980 eleven crops were sown once a month over a twelve month period to define the best time to plant improved varieties to derive optimum yields. The results of these studies proved useful later in the research programme when experiments to increase annual cropping numbers were commenced.

The increase in diversity of crops grown in the Province over the past six years is due to the definition of growing requirements of these crops by the research programme and extension by the Multiple Cropping Production Programme (MCPP). In addition, the ZDSDP road construction programme has opened up large areas of formerly isolated farming districts. Markets are more accessible and farmers now grow corn, upland rice, mungbean, peanuts and soybeans for export to other Provinces. Crop protection problems increased with the larger and more intensified crop areas and in recent croppings (1982-1983) more research effort has been put into disease, insect and weed control. Improvement and adaptation of small farm implements were made to facilitate easier management of the new cropping systems.

Many of the farmers who were introduced to "high technology" farming were unable to comprehend the urgency in the timing of many of the management practices and the necessity to follow closely directions, for example, on insecticide chemical bottles. Bad management resulted in poor yields and some farmers lost money using (or misusing) improved technology packages. In addition most farmers are either unable to take out credit because of lack of collateral, do not posses the equipment to manage high intensity crop growth, or live on land with a slope of greater than 8% (one of the limitations restricting applicants to the credit programme).

For these reasons a "low technology" extension programme was initiated and part of the research programme is now devoted to studies of this type. Experiments include the use of field legumes to raise soil N, mulching with high N organic material and varying crop population under low input management.

There are now seven sections to the research programme:

1. Varietal evaluation.
2. Fertilizer experiments.
3. Disease control.
4. Insect control.
5. Weeding experiments.
6. Cropping systems and
7. farm implement improvement.

In some of these categories (fertilizer experiments, disease and insect control) it is possible to conduct experiments in the laboratory and other enclosed areas. Recently at BRS a bamboo frame was covered with clear plastic to provide shelter from the rain to conduct pot experiments. This has proved very successful in conducting Rhizobium inoculation studies with legumes and fertilizer experiments on rice. However, these types of experiments have limited application on an applied research station.

Most of the initial baseline studies conducted at BRS and outreach sites are in the form of replicated small plot experiments. Varieties are generally evaluated in 5 m long plots that contain three to four rows of plants. Other experimental plots are usually longer to reduce the coefficient of variation. All experiments are conducted with four or more replicates.

Both the carabao and Brahman bull are used as draught animals at BRS.

The next step in technology development is to test the package in the farmer's field, using farmer labour but with research supervision. The ability of selected farmers to fully utilise the technology is then monitored. If the chances of success are considered to be high the MCPP establish demonstrations and use these to extend the improved practices to the farming community.

In some cases where the research team wishes to evaluate cropping patterns on a large scale or compare an improved practice with the farmers practice, replication is achieved in time and space rather than within an area. An example of this is where a researcher at BRS needed to evaluate a cropping pattern that required a rapid "turn around period between crops", tested it under farmer management on 5 farms and over two years.

The results of these experiments are extremely variable and it is difficult to statistically analyse them using traditional biometric techniques. Unless there is some baseline data to refer back to, only subjective observations are possible.

On-farm research is increasing in importance in the MCRP as more work is conducted on low technology farming. Here the benefits are cumulative over a long period of time and visual improvement such as soil conservation and amelioration can be noted. In this type of experiment small yield increases taken over one cropping cannot be measured because of the high variability between sites and cooperator practices. A different evaluation approach to the small plot experiments is therefore necessary.

RESULTS OF THE PROGRAMME

The research programme grew rapidly once it was established in 1978. During the 1978-79 season 13 experiments were conducted; in 1979-80, 26 experiments; 50 in 1980-81, 52 in 1981-82 and 61 in 1982-83. Approximately 65 experiments are planned for the 1983-84 growing season. The staff size doubled between 1980 and 1983 to accommodate the increased workload so that there are now 55 employees at BRS. The research station size was increased by 8 ha. with the purchase of a block of land one kilometre from Betinan.

Three annual reports containing research results have been published, a fourth is in press and a fifth is in draft form. In each report, recommendations are made for the results to be used in developing packages of technology for extension to farmers. Most of these are high technology packages which is in contrast to the predominant farming techniques used prior to the ZDSDP introduced cropping systems.

Before the MCP was piloted in 1977 the most popular crops grown by upland farmers in ZdS were corn, upland rice, cassava and sweet potato. Other crops grown to a lesser extent included mungbean, peanut and pigeonpea (Denning 1980). Crop varieties were almost exclusively native, they were grown with few commodity inputs, and yields were low.

Cropping systems are part of the programme at the BRS.

In order to diversify farm income and improve cropping systems a large number of different crops were evaluated for use in the Province. Apart from regularly testing improved corn, upland rice, mungbean, peanut and soybean; varieties of sorghum, wheat, cowpea, pigeonpea, Adzuki bean, sweet potato, sunflower, sesame, chickpea, safflower, rape, mustard, black gram, pole sitao, rice bean and bush sitao have also been examined.

Many crops yielded poorly in small plot experiments and no further work was conducted on them (sunflower, mustard, rape, safflower, chickpea, wheat). Others such as sorghum, pigeonpea, sesame and black gram yielded well under research conditions but markets need to be established before they can be grown on a large scale. Black gram for instance regularly outyields mungbean but the Filipinos tried eating the cooked grain and did not like its flavour. On the other hand sorghum has a small market for stock feed in the Province but this would be flooded if more than a few hectares were grown.

Introduced varieties of cowpea, adzuki bean, sweet potato, pole sitao, bush sitao and rice bean, invariably grow well in ZdS when they are provided with small amounts of fertilizer. The future of these crops is unlikely to be in large scale production but they could be grown in the home garden.

By 1981 the technology for growing corn, upland rice, mungbean, peanut and soybean had been established and recommendations for growing these crops were included in the production programme. Recommendations were based on data generated in small plot experiments, larger research supervised areas, and under farmer management. For each crop the list of recommendations include land preparation, seed variety and treatments, time of sowing, plant spacing, fertilizer rates and timing, weeding operations, crop protection practices and harvesting and threshing techniques. If the farmers followed all of the recommendations, crop yields could approach those achieved under research management. However, average farmer yields in the Province are generally well below those of BRS. In Table 1 research yields of Phase 5 and 6 are compared with the average yields of all farmers in the production programme.

TABLE 1

RESEARCH YIELDS COMPARED WITH FARMERS YIELDS
(same variety)
Yields t/ha.

		Rice	Corn	Mungbean	Peanut	Soybean
Phase 5	Farmers	3.36	–	0.65	0.70	–
	BRS	3.45	3.97*	0.76	1.75	1.71
Phase 6	Farmers	–	1.01	0.42	0.56	0.30
	BRS	–	–	1.04	–	1.11**

* With a higher rate of fertilizer
** Average of 13 varieties

Inconsistent adoption of MCP recommendations by farmers contributes to these differences. Many farmers spread the credit crop inputs over the entire farm leaving the High Yielding Variety crop with insufficient fertilizer and crop protection to optimise their yield potential. A few farmers have been known to sell their fertilizer. Other variables include late planting, deep seeding, low seeding rates, late weeding and late harvesting. Some farmers may even understate their yield for taxation purposes.

Research conducted at BRS is of an applied nature. Therefore a large percentage of the experimental results have been used in technology packages developed for the farmers of ZdS. In addition the varietal evaluations conducted at the station are coordinated through national bodies (IRRI, UPLB, PCARRD). This influences the release of commercial seed suitable for the Province.

Training research staff in experimental design and evaluation by Australian consultants has been successful and senior staff members are now capable of teaching young researchers these disciplines. Training in the interpretation of results, report writing and presentation is a continuing process and some staff members will attend conferences in the future to update their capabilities in this area. Dormitory and seminar rooms have also been used by technicians and farmer groups in their respective training programmes.

FUTURE OF THE RESEARCH PROGRAMME

One limitation to the continuation of a successful research programme is the need for one or two highly motivated and well trained senior research staff members. At present most of the BRS researchers are able to conduct a designed experiment, collect data and analyse the experimental results. However, there is a need for a research team leader who can identify the area in need of research, interpret the results and prepare a report of international standard. This is possible only through assistance from the project in training one or two staff members to a Masters or Ph. D. level. There is no system within the Ministry of Agriculture (MA) to attract such a qualified person to work at Betinan.

The long term future of the research programme at BRS is dependent upon continued injection of operational expenses. At least ₱700,000 will be needed to operate BRS during 1983. Salaries will cost ₱250,000 and seed, fertilizer and maintenance expenses a further ₱450,000. While there is increasing pressure for the Philippine Government to reduce departmental expenditure, this amount may be difficult to justify when the Australian commitment terminates. It is possible that financial support may be gained from programmes such as Rainfed Mindanao. However, there is no certainty of this at present.

With further support from the Philippine government or from outside sources, and with the training of one or two key staff members, BRS is capable of continuing an extremely productive research programme.

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THE MULTIPLE CROPPING PRODUCTION PROGRAMME

Anthony K. Kirwan - Production Agronomist

INTRODUCTION

The Zamboanga del Sur Development Project (ZDSDP) cooperates with the Philippine Council for Agriculture, Resources Research and Development (PCARRD), the National Food and Agriculture Council (NFAC), the Bureau of Plant Industry (BPI) of the Ministry of Agriculture (MA) and other agricultural and allied agencies of the Philippine government to develop, evaluate and disseminate more productive and stable cropping systems for upland and rainfed lowland areas of Zamboanga del Sur (ZdS). These cropping systems are designed to be relevant and acceptable to small landholders, for increasing farm income and improving the nutrition of the farmer and his family. A ZDSDP Multiple Cropping Project (MCP) was seen by the cooperating parties to fit the required criteria and was instituted in 1977.

The general purposes of the MCP are to conduct: -

(1) An applied research programme to test component technology and cropping patterns on different soil types and different climatic areas of the Province.

(2) A crop production programme to test the most promising crops and cropping patterns under conditions of farmer management with supervision by production technicians.

The specific project purposes of the Multiple Cropping Production Programme (MCPP) are: -

(1) To improve the capability and capacity of the Ministry of Agriculture within the Province.

(2) To provide improved cropping technology on upland farms with close technician supervision and monitoring.

(3) To coordinate off farm support services.

(4) To identify production problems requiring further research and to act on those problems.

1. Background

The MCP commenced in ZdS in 1977 with the aim of testing the most promising crops and cropping patterns under conditions of farmer management with supervision by MA technicians.

It was found early in the programme that use of technology adopted from elsewhere was often not satisfactory in ZdS and in 1978 a research programme commenced to: -

(1) Develop the technology for new crops and cropping patterns.

(2) Research the component technology required for upland crops already in the production programme.

Research is carried out at Betinan Research Station (BRS) managed by MA/ZDSDP and staffed by 13 MA researchers.

One of the main constraints in convincing farmers to adopt new technology has been and still is, the lack of suitable credit [1] to finance the cropping operation.

In introducing a credit scheme to finance new cropping technology both farmers and lending institutions need to be satisfied that the technology is economically viable.

To achieve this, a 4 step sequence was adopted by the MCPP.

(1) Demonstrate the new crops or cropping systems in small plots financed by ZDSDP. This is necessary where limited seed is available and where a large range of potential crop types and management alternatives exist.

(2) Invite interested farmers to grow the crops under close project supervision, with inputs provided by an interest free loan, from ZDSDP, repayable after harvest.

(3) Arrange for the Philippine National Bank (PNB) and the Rural Banks to advance loans to nominated farmer cooperators, at a commercial interest rate but with some guarantee from ZDSDP against loan default.

(4) Once farmers and lending institutions have confidence in the new cropping technology system, remove all artificial incentives and guarantees, allowing farmers to obtain credit through Masagana type loaning channels from the PNB, Land Bank and Rural Banks.

In 1977 a revolving fund was established by the ZDSDP to finance the evaluation of alternative crops and cropping patterns under farmer management, for inclusion in a credit programme. This fund was used in 1978 to finance farmers in six municipalities.

Corn, mungbean and peanut were financed for the second cropping of both years. A good repayment result was achieved (Table 1) despite an early start to the dry season in 1977 which seriously affected yields.

TABLE 1

SUMMARY OF THE REVOLVING FUND CREDIT LOANS

	Number of Farmers	Area (ha)	Repayment (%)
1977	32	20	80
1978	109	78	92

2. The existing Scheme

The success of the revolving fund led to the signing of a Memorandum of Agreement in late 1978 for the PNB-ZDSDP Credit Scheme. Initially, the agreement required the Australian Government to deposit ₱160,000 as a guarantee for 50% of loan releases by the PNB. However, due to increasing cropping costs, the loan ceilings were raised leading to the guarantee being lifted to ₱200,000 in 1980 enabling the PNB to lend up to a limit of ₱400,000. The ceilings were further increased in 1981 by the addition of NFAC money to the guarantee fund.

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[1] Suitable credit is that which farmers repay to ensure future loans and where technology packages are suitable to their needs and resources.

TOTAL LOANS GRANTED:

PHASE AND DATE	NUMBER OF ACCOUNTS	AMOUNT	REPAYMENT (%)
I (1979/1)	188	₱ 93,780.00	90.
II (1979/2)	293	₱126,775.00	92.
III (1980/1)	391	₱259,050.00	88.
IV (1980/2)	559	₱345,000.00	96.
V (1981/1)	914	₱798,500.00	88.
VI (1981/2)	1,118	₱707,400.00	77.
VII (1982/1)	537	₱546,455.00	77.
VIII (1982/2)	565	₱398,515.00	73.
IX (1983/1)	522	₱523,500.00	94.
X (1983/2)	837	₱612,450.00	cont. to Mar. '84

It is estimated that approximately 2,500 farmers have had a loan from the scheme.

Loans are released only in the form of input chits for seed, fertilizer and chemicals. No cash portion is issued. It was considered that a cash allocation has been a major area of loan misuse in other programmes and increased the chances of high default rates. Putting the responsibility for labour costs with farmers is also designed to ensure the farmer has an investment in the crop. He is then motivated towards obtaining higher yields, allowing a better loan repayment.

Further investigation has shown that a reason for farmer drop out and low crop yields has been the high labour input required for MCPP crops compared to traditional methods of farming. Farmers who do not have family labour or cash available to hire labour tend not to weed at the optimum time. The programme has developed small weeding implements in an effort to overcome some of these problems. Another solution would be to include a cash portion to pay for weeding which research has shown greatly increases yields.

The selda system for extending loans with a group of 3-7 farmers being jointly responsible for each others loans was used from Phases I to VII. However, this joint responsibility was not enforced.

A new system of group lending began in Phase 9 with the entry of the Land Bank directly into the lending programme. The group comprising all MCPP farmers in a barangay is a legally constituted body and will streamline the organization of the distribution of inputs. Although individual liability remains, farmers cannot remain in the group retaining their borrowing status without group agreement.

To be eligible for a loan, farmers should own a carabao or have easy access to one, to ensure they have the capacity to carry out the required cultivation. Surveys of MCPP cooperators have shown that approximately 78% own at least one carabao which is higher than the Provincial average for upland farmers of approximately 60%. Another reason given for farmers leaving the programme has been the lack of a carabao to carry out the necessary land preparation.

Loans are extended for a minimum of 0.5 hectares and a maximum of 2 hectares. The 2 hectares may be composed of one or more crops, each of at least 0.5 hectare.

Farmers who fail to meet the repayment deadline are not allowed another loan, except in special cases. An example of this is Phase I corn, where following crop failure due to unforseen pest problems, farmers were allowed to refinance another crop in Phase 2 to repay the loan and enable them to remain in the scheme.

It is worth noting that farmers have used other methods of repayments (e.g. proceeds from sale of stock or other non-financed crops such as copra) to retain their eligibility for Multiple Cropping Loans.

3. Technician Training and Supervision

Technician performance is a vital part of the system in ensuring that the improved technology reaches the farmers, is understood and then followed. At present both issue and repayment of loans are handled by the technician. The Rural Bank technicians assist with collections.

Technicians are assigned on a full time basis to the programme by the MA. The following procedure is adopted for introducing new technicians to the programme.

(1) They attend a Multiple Cropping Training Course, conducted by ZDSDP and MA.

(2) On assignment to an area, they are required to set up demonstration areas of a quarter hectare for each approved crop. This serves as training for the technician and a base for holding field days and recruiting farmers.

(3) Farmer meetings are held to encourage interest in the programme. The MA has a procedure for legally constituting a farmers association.

(4) They recruit up to 10 farmers for first loan releases. It is felt this number is sufficient for technicians to handle in their first season.

(5) They recruit and supervise up to 60 farmers in subsequent seasons.

All technicians attend a Multiple Cropping meeting held once a month. This meeting allows problems to be discussed by both technicians and supervisors. Topics include availability and timing of input supplies, pest and disease outbreaks, difficulties in marketing and monitoring loan repayments.

Meetings also include a specific training component in the form of a formal 2 hour seminar. Topics are planned to cover areas relevant to the particular time of the season and regular inspection of the field work at BRS is included. At least twice a year a field day is held at Betinan for both technicians and farmers.

All technicians attend a 2-3 day seminar twice a year wherein new recommendations and new technologies are explained and practised. Resource speakers from institutions such as IRRI are invited for specialist lectures.

In addition other training courses are held for special topics. Recently a training course was conducted for two days by the Land Bank of the Philippines. Technicians were instructed in and practised the specific requirements of "farm plan and budget" preparation for that bank.

A major change in organization during 1981 was the development of the supervisory system. In essence supervisors are responsible for technicians in a specific area rather than directly to the Australian Production Agronomist and his Filipino counterpart. This relates specifically to activities in relation to farmer supervision and crop management problems.

Every technician is visited once a week by a supervisor which ensures problems can be tackled quickly.

Summary of Technicians and Cooperators

Cropping	Number of Technicians	Number of Farmers
Revolving Fund (1977)	5	12
Revolving Fund (1978)	12	109
Phase I	12	188
Phase 2	20	293
Phase 3	30	391
Phase 4	37	559
Phase 5	42	893
Phase 6	46	1,110
Phase 7	50 (11 with releases (39 without releases	537
Phase 8	75 (42 with releases (12 without releases (21 undergoing training	565
Phase 9	65 (51 with releases (14 without releases	522
Phase 10	81 (55 with releases (11 without releases (15 undergoing training	837

4. Problems

(a) Credit

The large drop off in farmer numbers as reflected in Phase 7 was due to the failure of the 4 step sequence when banking institutions, notably the PNB, refused to see the programme as viable.

In view of repayment successes the PNB was urged to accept a lowering of the Australian loan guarantee rate from 50% to 30% but refused, and as a result finance was severely restricted. New sources of finance have had to be found, notably from the Land Bank of the Philippines, in a syndication deal with the Rural Banks.

These banks have accepted an initial guarantee rate of 25% for Phase 8 which fell to 15% during Phase 9. This has greatly increased the amount of credit available to farmers and has introduced flexibility into the programme.

Farmer Training...

Crop Management Instructions . . .

Farmers and Technicians field days...

Technician Training...

And Cropping Demonstrations using local and improved varieties are vital to successful technology dissemination.

Rural Banks are more responsive to the needs of specific areas and as such the bureaucratic methods and red tape of one large bank can be overcome.

(b) Seed Supply

The supply of good seed is a prerequisite to any cropping project. In the Philippines the supply of upland crop seed is far more difficult than lowland rice seed. Apart from corn, there are few crops which have a major demand in any single area. In ZdS all the upland food crops being promoted by the programme have obtained seed by local multiplication. When the programme began all seed supplies were paid for by the project with the idea that legumes would become more widely accepted. This did happen and a demand for good quality legume seed was created. A seed producers cooperative was formed in 1981 to help supply the seed but the development has been slow and many constraints became apparent, in particular the financial management and administrative capacity of small farmers.

The largest seed requirement that the programme has is for upland rice and this is grown by agricultural businessmen in the lowland areas. Corn seed and mungbean seed are successfully produced by the seed cooperative. Soybean is a recent crop introduction to the production programme and seed production will depend largely on the demand for seed during 1983-84.

Producing enough peanut seed to satisfy demand is a problem because of the large quantity required per hectare (130 kgs). Most of the peanuts are grown during the second cropping but many farmers grow small areas in the first cropping specifically for seed. This is the system the programme is encouraging because peanuts in ZdS have few crop management problems and the local variety has shown itself to be as productive as introduced varieties.

(c) Agronomic

Part 4 of the project purposes for the production programme is:

"To identify production problems requiring further research and to act on those problems".

During Phase I of the project rice, corn, mungbean, soybean and peanut all had technology packages developed as a first priority and farmers were able to receive loans to grow these crops. However during Phase II the growing of the crops on a broader and more intensive scale has exposed many problems.

(i)	Rice Blast in upland rice crops	- Phase 7
(ii)	Corn Borer in corn*	- Phase 1 and 6
(iii)	Pod borer in mungbeans	- Phase 6
(iv)	Soil erosion in all crops	

NOTE: * No corn loans during Phases 2-5.

Research requirements for the programme have now shifted from basic to applied problems. Both of the most serious problems, rice blast and pod borers, have required quick action using reasearch results and information from other sources, notably IRRI, supported by continuing MCP trials.

The problems have to a large extent been solved and this is reflected by an increase in farmer members for Phase 10. Phase 11 is expected to be the largest yet experienced by the programme.

(d) Extension and Technician Training

The immediate result of a programme using high technology packages is that flexibility of recommendations is vital if crops are to be grown successfully. Technicians are used to get the message to cooperators by demonstrations and field days because farmers often do not understand why changes have to be made despite the fact they may have suffered in a previous cropping.

In developed countries the research system is well suited to reasonably well educated farmers who are also served by private industry that invests in the research. A sophisticated communications network then passes the information on to a receptive audience who can choose from a variety of crop alternatives, input combinations and investment opportunities. The communication problems in ZdS are obviously different and more difficult especially when technology changes occur each cropping. This inevitably leads to some decisions being taken for the farmer. An example of this was when Lannate L was substituted for Endosulphan for the control of pod-borer in mungbeans. This decision upset some farmers who did not want to use a chemical they had not tried or seen used elsewhere.

We are convinced that despite some extension problems, if crops remain profitable then farmer cooperators will be found.

5. Farmer Exit from MCPP

Although the programme has shown high loan repayment rates an average of 47% of farmers have left the programme in every phase. The major reasons given by those leaving were low yield, high labour requirements and low profitability. In every phase a certain yield distribution can be shown to occur. Based on the mid and upper sections of this distribution plus farmer based research yields the crops promoted by the programme are potentially very profitable. That many of the farmers can achieve these yields is a good sign but intensive technician training and farmer extension is required to increase the percentage of successful cooperators.

A survey of the exit farmers showed a reasonable level of technology acceptance in terms of crops and varieties grown, fertilizer use and planting methods. This acceptance of the full technology or components of the technology is evidence of the diffusion of component technologies to farmers, who while not prepared to accept credit, have adopted the components which they consider useful.

6. Conclusions

The ZDSDP Agriculutral Project goals are:

(i) To raise the standard of living of the majority of the population of the Province and

(ii) to generate a self sustaining development capacity in the Province.

In the production programme the solving of problems are only the means to an end. This has always to be kept in mind because as an agriculturalist one is inclined to see the solving of technical problems as the end rather than the project goals.

Acknowledgement to T. Ole for statistical information.

MULTIPLE CROPPING EXTENSION PROGRAMME

Lance E. Brooks - Extension Specialist

INTRODUCTION

In Chapter 4 the project methodology for managing agricultural development is described. At three points in this methodology, contact with the farmer is essential:

1. Study of farming methods and identification of farmers problems.
2. Proving technology appropriate by testing it on farms.
3. Mass extension to farmers of that technology.

The Multiple Cropping Extension Programme (MCEP) is largely concerned with the last of these activities. It naturally commenced later in the ZDSDP, after the research and proving activities had identified better upland crop technologies worth recommending to small farmers in an extension programme.

RATIONALE

The Multiple Cropping Production Programme (MCPP) services the needs of farmers prepared to risk a bank loan to grow a cash crop. To improve the likelihood of a successful cropping the banks require that proposed credit crop farms are inspected for their site and slope suitability before loan applications are granted. The more fertile, undulating areas of the Province are therefore more suited to the MCPP and it follows that the programme will concentrate its extension activities in those areas. It should be noted here that the extension arm of the MCPP has been very effective in its resolve to keep farmers in the programme informed of new technology, status of loans and crop advice. The MCPP has in fact gone closest of all the Ministry of Agriculture (MA) programmes to achieving success in the Training and Visit extension method.

The MCEP addresses itself to those areas outside of the MCPP influence where farmers for reasons of unsuitable land, peace and order instability and distance from markets cannot take risks with their meagre capital.

OBJECTIVES

The objectives of a mass extension programme can be many and varied: from the general community education concept through to information pertaining to a specific problem. The following could be considered to be the objectives of the MCEP:

a) To generate awareness of new technologies.
b) To create positive attitudes towards these technologies.
c) To provide an early warning service to farmers on potential problems and solutions to current problems.
d) To provide general interest programmes for special target groups.

MASS EXTENSION PROGRAMME - METHODOLOGY

Since the inception of the agricultural component of ZDSDP, a considerable amount of crop technology relevant to the conditions existing in Zamboanga del Sur (ZdS) has been developed. To ensure the continued agricultural development of the Province, it is important that this technology is disseminated to as broad a rural audience as possible.

The main thrust of the extension message will centre around the proven recommendations generated for upland rice, maize, mungbean and peanuts. Where appropriate, those crop recommendations developed by other sectors of the MA namely root crops, vegetables and fruit trees will be included in the service. Further, a low input crop production research programme based at Betinan, has developed recommendations for farmers who for various reasons either will not accept a loan situation or live on marginal cropping lands or farm under coconuts. As the extension responsibility for these farmers lies outside the MCPP sector, the MCEP will develop strategies to service them with information relevant to their situation.

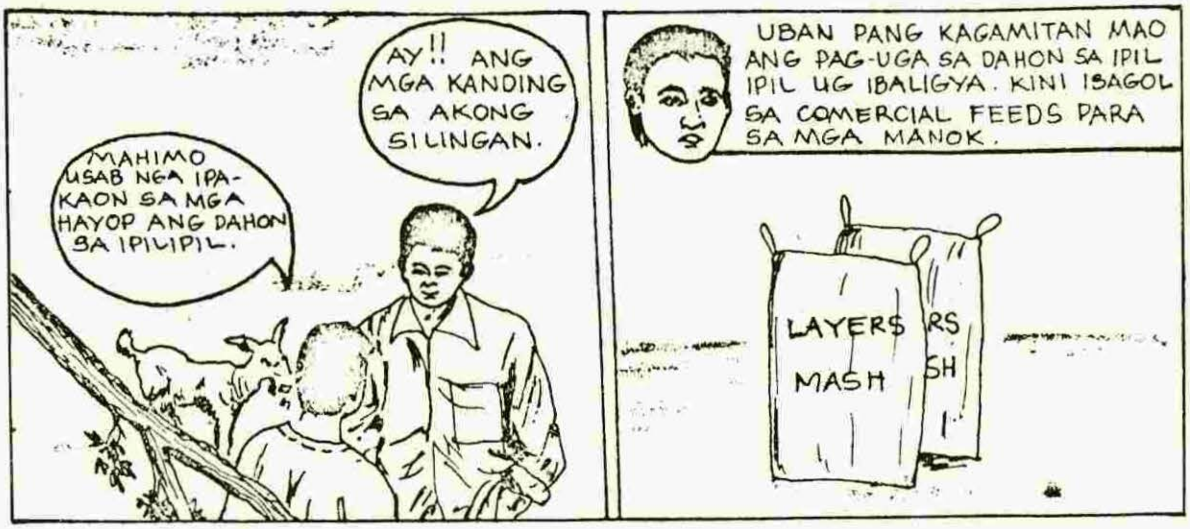
It is envisaged that the extension programme will be a long term venture, providing a continuous flow of information to farmers in the Province. Initially however, the extension team will create within the rural population, an awareness of the possiblities for crop diversification and improved management, particularly in the steeper uplands.

The intriguing question as to how that information could be effectively conveyed to the farming community has been under consideration for some time

After considering the alternatives the comic format was chosen as the primary vehicle of crop information dissemination. Local dialect, culturally based dialogue, coupled with readily identifiable place names and personal names would then embellish the technical message.

Comics are an important medium of communication in rural areas. It is estimated that more than 3 million comics are dispersed through the Province each year. Many people collect them into series and read them over and over. They are popular in a 'soap opera' sense and are used to create attitudes where none previously existed.

Many agencies use comics to present persuasive communications and the adoption of this medium by MCEP capitalises on the undocumented but clearly positive experience of others. An extract from a comic on the uses of ipil-ipil appears below.


AY!! ANG MGA KANDING SA AKONG SILINGAN.
MAHIMO USAB NGA IPA-KAON SA MGA HAYOP ANG DAHON SA IPILIPIL.
UBAN PANG KAGAMITAN MAO ANG PAG-UGA SA DAHON SA IPIL IPIL UG IBALIGYA. KINI ISAGOL SA COMERCIAL FEEDS PARA SA MGA MANOK.
LAYERS MASH
RS SH

EXTRACT FROM BULAWAN SA BAKILID NO. 2

Coupled with the comic strip publication briefly described above is an "Extension Bulletin" printed in English and its counterpart Visayan version called "Kaumahan" (Farm News). Both publications will contain similar information to the comics, but will be presented in a more formal manner. These publications will be distributed to Municipal Agricultural Officers, agricultural technicians, interested farmer groups and agricultural students in the Province. An example from a "Kaumahan" published on soil conservation appears below.

KAUMAHAN

ANG PAGBUTANG SA BATO LINYA PALIBOT SA BAKILID UG ANG MGA KAHOY KAHOY, MGA SAGBOT, LUYO SA MGA BATO KINI USA SA PAMA-AGI SA PAG-PAHINAY SA BANLAS SA TAMBOK NIMONG YUTA.

At appropriate times, attractive wall posters depicting aspects of the material covered in the comics and technical bulletins will be produced and distributed to Municipal Agricultural Officers, farmers groups and students.

Comics and posters will be released at about the same time.

Between these releases, supportive and complimentary radio bulletins will reinforce the visual communications already disseminated. Indeed, broadcasts related to information contained in the first comic and the initial Technical Bulletin on soil erosion, have been in operation since June 1983.

MASS EXTENSION PROGRAMME - TARGET AUDIENCE

A relay station is required to disseminate the original message to a wider audience. There are many groups who could act as receptors and ultimately relayers of this information.

The groups most likely to benefit from a crop extension programme in ZdS are:

1. RECENT GRADUATES FROM AGRICULTURAL INSTITUTES
2. SENIOR SECONDARY SCHOOL STUDENTS
3. LINE AGENCY TECHNICIANS

4. BARANGAY ASSOCIATION, FARM GROUPS, COOPERATIVES, NGO'S
5. COMMUNITY GROUPS - ANAK BUKID (4 H) - RURAL IMPROVEMENT CLUBS (R.I.C.) - WOMENS GROUPS

The methods chosen to disseminate the information on crop technology and management, soil conservation, land management, hillside farming and alternative crops will depend upon each groups previous experience and level of education.

Thus for example, the first two groups would be given relevant lectures and be required to maintain demonstration plots whereas the subject matter for the line agency technicians could relate more to the intermediate to low input level such as hillside farming.

The latter two groups who are community based and voluntary organizations will require information provided in response to their perceived problems. Field trips will be a useful disseminating medium for these organizations.

The task of the MCEP is to provide the correct message to each of these disparate groups.

EVALUATION OF EXTENSION DELIVERY SYSTEM

Evaluation must be in terms of the objectives of the venture.

The MCEP is still in its infancy. Nevertheless, many questions are being asked about its mass extension programme e.g.

How effective is the mass extension programme?

What direct benefits do farmers receive in terms of improved management?

Is the coverage too thinly spread?

Can the support services cope with the expected increase in interest aroused by the publicity campaign?

Is the extension service merely a public relations exercise, or should it be of direct practical value to the farmers of the Province?

Funding agencies require some degree of accountability for money invested. On what criteria should the evaluation of the effectiveness of a programme be based?

Is it sensible to evaluate a fledgling programme in terms of adoption?

Funding agencies sometimes look for immediate results from the extension packages in terms of attitude changes to a new technology suggesting that the extension message is able to replace the technician in an isolated area. This is a mistaken idea. Mass communications are an aid to the technician not a substitute for him. Mass communications usually generate a demand for further information on a face-to-face basis.

The information may be satisfying a range of needs in the community that outsiders cannot see.

It is proposed that a survey of a few barangays be conducted during the first extension year to obtain feedback and find out if the programme is reaching the target audience and having the desired effect.

UPLAND FOOD CROP SYSTEMS HILLSIDE FARMING/AGRO-FORESTRY

Lance E. Brooks - Extension Specialist

INTRODUCTION

Subsistence farmers continue to crop steep denuded hillside in Zamboanga del Sur (ZdS), despite the on going processes of soil erosion that have been exacerbated by uncontrolled logging and Kaingin (slash and burn) practices.

An obvious need exists to stabilise these hillside environments, to slow down the rate of soil loss and to rebuild soil structure and fertility. The resulting increase in the productive capacity of the uplands would improve the social, economic and political situation for the inhabitants of these marginal cropping areas.

HISTORICAL ASPECT

The Agro-forestry project incorporating soil erosion control, reafforestation and diversified cropping practices was instituted in 1981 in response to the limited relevance of the Multiple Cropping Production Programme (MCPP) to farmers in the steeper upland areas. In order to guarantee loan repayments, banks quite reasonably insist that crops grown with credit should be located in the more fertile, undulating areas of the Province. The terms and conditions of the loans thus effectively exclude some 40% of the Province's farmers from direct contact with the crop technology generated at the Betinan Station (BRS).

A cropping project, relevant to the steeper lands, with soil conservation as its primary objective was needed to fill the vacuum. The problem was how to integrate an established crop programme, with proven slope stabilisation and crop production components. Existing hillside contour cropping projects on the island of Cebu and in the Province of Davao del Sur eventually provided the Zamboanga del Sur Development Project (ZDSDP) with the necessary models on which to base a similar system.

The Southern Mindanao Baptist Rural Life Centre, under the guidance of the Rev. Harold Watson has developed at Bansalan, Davao del Sur, an integrated farm demonstration area. A vital component of the total farm system is the contour stripped hillside immediately adjacent to the farm area. This steep hillside, previously unproductive, has been transformed into an area producing a wide range of permanent, semi-permanent and annual crops. This system of farming denuded, eroded slopes has been labelled Sloping Agricultural Land Technology (SALT) and has gained wide acceptance in the upland areas around Bansalan.

Considering the similarities in climate and topography of both Davao del Sur and Zamboanga del Sur, it became apparent that the hillside farming technology developed at Bansalan was, at least in part, applicable to the needs of upland farmers in this Province. Accordingly, the SALT system generated at the Rural Life Centre was transferred to the denuded, erosion prone hilly cropping areas of Zamboanga del Sur.

OBJECTIVES

The objectives of the hillside farming/agro-forestry projects are threefold : -

(1) To slow down the rate of the soil loss from the steeper denuded cropping lands, by planting hedges of a tree legume such as ipil-ipil (Leucaena leucocephala) on the contour, so that a barrier to rapid water movement is created.

(2) To diversify cropping systems for upland farmers such that family nutrition and farm income are not totally dependent on the growing of a single crop of corn each year.

The alleys created by the contour hedges are ideal areas for crop diversification. The hedge acts as a fence, thus allowing the farmer to increase the variety of crops grown by managing the hillside in compartments.

(3) To provide a readily accessible, inexpensive form of organic fertilizer which can be applied to the soil in the cropping alleys adjacent to the ipil-ipil hedges. A tree legume such as ipil-ipil supplies organic nitrogen and organic matter when cut and applied to the soil as green mulch. Field trials at BRS with unfertilized corn mulched with ipil-ipil in the second cropping of 1982 showed yield increases of more than 50% over the unmulched corn. (Dofeliz et al 1983).

DEVELOPING A HILLSIDE CONTOUR CROP SYSTEM

An area of 1 hectare is considered the maximum amount of contour cropped hillside that can be managed by a farmer and his family (Watson 1982).

Development of the sloping area should begin early in the rainy season. Site preparation should commence at the top of the slope.

(1) Contour lines 3-5 metres apart (depending on slope) are located and marked around the slope, using an A-frame. As a rule of thumb, a vertical interval of 1 metre separates the contour lines. However, for optimum conditions of erosion control, the width of the alleys should be no greater than 5 metres. (Watson 1982).

(2) Two furrows are formed on either side of the contour line approximately 50 cm apart.

(3) Seeds of the giant Leucaena species should be selected in the dry season from trees of known stock. Seeds should be hard, and shiny brown to black in colour.

(4) If the soil is known to be acidic or infertile, apply a basal application of a phosphatic fertilizer to ensure that seedling growth is vigorous.

(5) Leucaena seed which has been soaked in water overnight is then sown into the furrow and covered with soil. On steep slopes seed washout can be a problem.

(6) Weeding around the Leucaena seedlings is very important in the first month to 6 weeks of growth. Competition from weeds at the early stages, before

the tap root is developed, will severely restrict growth of the seedlings. Similarly heavy grazing by animals in the first 2-3 months could lead to severe stunting or death of whole sections of the contour strip.

(7) Approximately 6 months after planting (if planting took place early in the wet season) the leucaena plants can be trimmed back to a height of 1 metre. The cut herbage is placed around crops growing in the alleys formed by the leucaena hedges. It is advisable that cut leaves and stems be incorporated into the soil to prevent loss of nitrogen by volatilisation,

(8) The possibility exists for a variety of crops and crop combinations to be grown in the alleys. Permanent stands of trees such as gmelina, cacao, leucaena, kalamansi, mango, can be situated at the top, middle and lower levels of the cropped area. Semi-permanent crops such as pineapple, the annual crops maize, peanut, mungbean, upland rice and others, vegetables, root crops and leguminous pasture species can then be alloted alleys on the slope according to the needs and management skills of the farmer. Maize and rice crops should be alternated with legume crops of mungbean, peanut and cowpea.

(9) The multiple uses of leucaena are well documented. For example it is a source of building timber and charcoal. It is a shade tree and a stock feed. Dried leucaena is used for rations, while green foliage is fed as cut and carry fodder. In summary, rapid growth and prolific regenerative powers following cutting or grazing make leucaena the ideal tree component of any hillside cropping programme.

INSTITUTIONALISING THE HILLSIDE FARMING/AGRO-FORESTRY PROJECT

From the outset of the project, the Bureau of Forest Development (BFD) was identified as the counterpart line agency, due to the reafforestation aspects of the programme and the fact that the BFD has wide ranging legal powers in the management of steep lands throughout the country.

Accordingly, a joint BFD/ZDSDP agro-forestry project was created with technicians assigned to the 6 municipalities identified as having a high proportion of steep, denuded crop land. Each agro-forestry technician is required to develop a nursery area from which forest and fruit tree species are dispersed to interested farmers.

The technicians have limited administrative links with the BFD as salaries are provided by the Provincial Government under an environmental conservation budgetary vote. Professionally, the technicians receive training and extension support through the ZDSDP. In effect, the agro-forestry project was initially a part of the BFD in name only.

The BFD supported the concept of reafforestation with production in principle but hesitated at the Regional level to actually spend money on the project. In fact, the first BFD funds to reach the Agro-forestry project in Pagadian City arrived with the Regional disbursing officer in mid May 1983.This lack of financial commitment by the BFD Regional Office has created an atmosphere of doubt as to the long term prospects of the agro-forestry programme under that agency.

Meanwhile, the Ministry of Agriculture (MA) has seen fit to commence its own Hillside Farming Project with exactly the same hillside strategies as the BFD Agro-forestry programme. A substantial budgetary commitment for the

A developed hillside system

Corn planted between rows of Ipil-ipil

Pineapples in between rows of Ipil-ipil

1984-85 period has been made to the joint MA/ZDSDP projects. The MA philosophy is in effect slightly different in that they intend operating demonstration sites in areas of a less steep nature, and more specifically on farms with integrated systems incorporating cropping, livestock, pasture and fishponds, much like the Bansalan model. They are not stressing the reafforestation aspects of hillside farming to the same degree as the BFD.

The fact that the two agencies are operating in parallel is unfortunate and must result in a duplication of funds and endeavour. It is to be hoped that common sense will prevail such that the BFD offers its expertise in the technology related to contouring and reafforestation, while the MA concentrates on extending its considerable experience in the cropping sphere. Nevertheless, an administrative demarcation line exists with respect to responsibility for sloping lands. The MA has no role in steeplands and should the law prevail, areas of responsibility will continue to be different. Sensibly the programme should be integrated and cooperative.

LIMITATIONS TO ADOPTION OF TECHNOLOGY

Farmer acceptance of any new technology will depend not only on how those new practices will benefit the individuals in terms of health and wealth but also as to how those practices can be smoothly absorbed into already well established patterns of community living. Farmers the world over are conservative people who adopt a new concept only when they are fully satisfied and comfortable in the knowledge that the innovation will be of benefit.

The subsistence hillside farmer of ZdS is no exception and if anything, is more reticent than most to plunge headlong into something new without first gaining visual proof. Upland farmers have scratched out a livelihood for the past 30-40 years in ZdS by planting one or possibly two crops of corn each year on extremely steep land. They have watched their yields dwindle alarmingly. However, they remain relatively comfortable with the technology and the lifestyle associated with such a practice. On-farm planning is restricted to the current crop and given the uncertain economic climate and the variable peace and order situation, any future thinking extends only to the next crop.

Consider the impact of the following technological components of the contour cropping system on farmers who have traditionally grown corn-corn on their hillsides.

How does the farmer come to terms with a system which:

a) Physically reduces the area of land for planting by up to one-third (leucaena hedges).

b) Requires 2-3 years before positive yield increases from the increased soil fertility are obvious.

c) Requires constant cutting of hedges and mulching of herbage to improve soil structure and fertility.

d) Necessitates a long period of time for soil build-up to produce the terraced alley effect.

e) Encourages crop diversification on slopes that traditionally have supported only corn.

f) Requires the former subsistence corn farmer to make complex management decisions about the choice of alley crops, rotation combinations and end use of produce grown.

g) Requires the farmer to incorporate permanent tree stands on land for which he has a short term lease, or worse, land that has not been titled?

The long term objectives of such a programme are obviously difficult to attain. To impose the above technology onto very conservative farming communities requires substantial attitudinal changes on the part of the farmers before widescale adoption of the SALT system can be achieved. There needs to be a corresponding commitment on the part of the line agencies and their assigned technicians to be sensitive to the needs of the upland farming community.

Finally, we as consultants assessing the agricultural needs of the upland areas from a detached cultural viewpoint, may consider the farmers acceptance of the contour strip system as a matter of course, given the sound, scientific basis for the technology.

It is important that we allow for a period of farmer adjustment so that old accepted methods can be interlaced with the new.

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UPLAND RICE

Harry J. Nesbitt - Research Agronomist

INTRODUCTION

Zamboanga del Sur (ZdS) has a climate which is particularly suited to the production of upland rice. The crop is planted after the first good soaking rains of the season which generally occur in mid or late April. There is little drought stress in the following four months when rainfall in the Province averages between 250 and 450 mm per month. Poor crop growth results in low yields if rice is planted after mid May, and rat infestation and drought limit yields during the second cropping (starting in September). Despite the annual wet season cropping limitation, upland rice accounted for 21.6% of all rice produced in Southern and Western Mindanao during 1972, (IRRI, 1975). Although a recent census has not been conducted, farmer based information indicates that the areas planted to upland rice in ZdS have increased considerably over the past two decades. Some of the area previously planted to corn was converted to rice production. Therefore rice is increasing in importance as a source of grain for home consumption and for sale.

In a survey conducted during 1978 (Denning 1980) the average rice yield was reported to be 1030 kg/ha. The Multiple Cropping Project (MCP) investigated, developed and extended management techniques to increase these yields and improve profitability.

PROGRAMME EVOLUTION

In Denning's (1980) survey the major constraints to upland rice production were identified. The survey found that most of the crop was grown for home consumption, yields were low and very few farmers could afford to use fertilizers. Many farmers had stopped growing upland rice using traditional farming practices because of low yields. Others could not start production due to the lack of seed and technical advice.

In the latter part of 1977 the Philippine-Australian Development Assistance Programme (PADAP) piloted a multiple cropping credit programme by establishing a revolving fund to finance farmers. In succeeding years the Philippine government became increasingly aware of the need to support small farmers and by the first cropping of 1983 a national bank was providing funds to eligible farmers in the Province without a repayment guarantee by PADAP.

When the Philippine National Bank commenced their involvement in the programme during 1979 the croppings were described as Phases. Phase 1 was the first cropping in 1979, Phase 2 the second; Phase 3 the first cropping in 1980 and so on.

Farmers have shown particular interest in growing upland rice using the inputs provided by the credit programme, and the number of cooperators increased dramatically from Phase 1 to Phase 5. In the past, national priorities have been directed towards growing other crops such as corn in the upland areas. Masagana rice funding is limited to the lowlands and the Philippines Crop Insurance Company (PCIC) was previously directed not to insure upland rice crops. However, the PADAP credit programme has proven that the production of upland rice using high yielding varieties (HYV's) and improved management practices is profitable (Table 1). When Phase 1, 3 and 5 results were shown to the PCIC they agreed to insure upland rice crops funded by the programme.

TABLE 1

RICE PRODUCTION IN THE MULTIPLE CROPPING PRODUCTION PROGRAMME (MCPP)

	PHASE 1	PHASE 3	PHASE 5	PHASE 7
Number of Farmers	4	141	723	429
Average yield kg/ha.	3403	3710	3363	1765
Loan payment %	100	83	87	53
% of farmers above break even yield	100	87	76	51

Initially farmers were offered "best-bet" recommendations. These were progressively changed as more information became available, both from national sources and through research conducted by the Multiple Cropping Research Programme (MCRP) at its research Station based at Betinan Research Station (BRS). As the recommendations were updated, the technical staff were trained by the Multiple Cropping Production Programme (MCPP) to transfer the technology packages to the farmers, who were provided with HYV seed, fertilizer and other inputs to ensure good crop yields.

The first variety recommended by the programme was C22 and this was used during Phases 1 and 3. For Phase 5, UPL Ri 5 was introduced to some areas after MCPP personnel had noted an increase in the incidence of rice blast in C22. During Phase 5, C 22 was severely affected by blast in some areas and it was decided that it would have to be replaced.

IR 54 had been yielding well in replicated variety trials at BRS and had shown no signs of blast. It was recommended for inclusion in the programme during Phase 7 as a replacement for C 22.

During Phase 9 the variety UPL Ri 7 replaced IR 54 because of the severe blast problems in Phase 7. UPL Ri 5 was still recommended in areas that were unaffected by blast in Phase 7 and C 22 was recommended in newly opened areas.

Initially the seed was planted at the rate of 50 kg/ha in rows spaced at 40 cm. In Phase 3 the same seeding rate applied but the distance between rows was reduced to 25-30 cm. In subsequent years the rate was increased to 60 kg/ha with row spacing at 25 cm.

The fertilizer recommendation for rice in Phase 1 consisted of applying 100 kg/ha of urea basally and 100 kg/ha 50 days after emergence. In Phase 3 when the importance of phosphorus on some soil types was realized, the recommendation was changed to 200 kg/ha of ammonium phosphate and 100 kg of urea 55 days after emergence. This recommendation remained current through Phases 5, 7 and 9.

Crop protection procedures have generally followed the national recommendations and the farmers are advised to keep their crop weed free for the first six weeks after emergence.

RESULTS TO DATE

Rice variety evaluations are conducted at BRS during the first cropping of each year. High yielding and local varieties which are suited to both lowland and upland conditions have been examined. An average of the yields of varieties grown at BRS during 1980, 1981 and 1982 show the highest yielding variety is one developed by IRRI for lowland conditions (IR 54). A number of other varieties, some of which were selected by IRRI for upland conditions, follow closely in yield potential.

To examine the performance of the best of these varieties over a wider range of conditions the MCP introduced a multi-tiered varietal screening system in 1983. This involves continued replicated research trials at three sites, crop development trials in farmers fields and single row observational plantings spread throughout the rice growing areas of the Province. In addition, International Upland Rice Observational Nursery (IURON) and rice blast nursery trials are established in appropriate areas.

The agronomic success of rice varieties bred for lowland conditions is indicative of the suitability of ZdS for growing upland rice. During the months from May through to August the soil is generally at or greater than field capacity and in most years the crop does not suffer from drought stress. Because soil moisture is not a limitation to plant growth and soil fertility is raised by the application of fertilizers, it is possible to increase the plant population above that of crops sown in the traditional manner. It was for this reason that the row spacing was decreased from 40 to 25 cm in 1980. The closer row spacing was made easier by using a lightweight double winged furrower first developed by a Provincial farmer and later modified at BRS.

Fertilizer experiments conducted on the three predominant soil types in the Province showed that most crops respond to both nitrogen and phosphorus but not to potassium or any of the trace elements. On the two soil types on which most of the rice is grown there is more of a response to nitrogen than to phosphorus. This is particularly pronounced on the soils formed over limestone which are found in the lower end of the Province's two major peninsulars. Because of the variability within and between soil types the MCP elected to give a blanket fertilizer recommendation. This is currently 78 kg/ha of nitrogen and 40 kg/ha of phosphorus but is still under review.

Crop protection problems increased with the more intensified cultural techniques and yield losses to them were more noticeable. Insect pests including stem borer and rice bugs are controlled by the application of insecticides. If correctly timed, and recommended concentrations of insecticides are applied, there is generally good control of insect pests. However, plant diseases have recently had a devastating effect on crop yields.

Leaf blast and neck rot disease caused by the fungus Pyricularia oryzae has been a constant threat to the rice crops since the inception of the credit programme. In Phases 1 and 3 there was no noticeable reduction in yield because of the disease but farmers were recommended to sow early to avoid its effects. Blast was first identified to be a problem in Phase 5 with the variety C 22. In Phase 7, Ri 5 and IR 54 were given to cooperators, but a number of farmers preferred C 22 because of the previous years good yields.

During Phase 7 (first cropping of 1982) 42% of the area was sown to C 22, 33% to IR 54 and 24% to Ri5. All of these varieties were affected with blast but for IR 54 it was particularly devastating. Races of the fungal causal organism that were virulent on a particular variety appeared to change as the season progressed and many of the crops that suffered from neck rot did not have severe leaf lesions earlier in the season. In addition the races appeared to be very specific. The fungus being particularly virulent on one rice variety did not necessarily affect a different variety growing next to it.

Plant pathologists at the International Rice Research Institute (IRRI) suggest that several varieties can be rotated from one season to the next to avoid a build-up of a virulent fungal race. It is proposed that an "early warning" system can be provided by establishing small plots of several varieties in a number of sites distributed throughout the major rice growing areas. A programme of rice variety selection can then be formulated for parts of the Province where the disease is prevalent.

The long range solution to the rice blast problem is the development of varieties that are resistant to the disease. IRRI has recently employed a plant breeder to work in this area and the personnel of the MCP have offered to fully cooperate with the programme.

Rice blast has never been a major problem on BRS except when crops are planted late. For this reason rice blast has not been a factor limiting yield during varietal evaluations. Therefore if the "disease avoidance" system is adopted, as suggested by IRRI, there will be yield date on a large number of varieties for use in the programme.

Fungicides have not proved effective in controlling rice blast in the MCP. In Phase 3 the application of benomyl was recommended if blast was severe. This was changed to edifenphos for Phases 5 and 7 and to mancozeb in Phase 9 when edifenphos proved to be extremely toxic to the sprayer operator. Rice blast is most severe during the wettest months (June and July) and the major reason for the failure of the fungicide to control the disease is the fact that there is generally a very short contact period between the chemical and the plant leaf before it is washed off by heavy rain.

Another disease, suspected of being induced by the orange leaf virus, first became prevalent in upland crops during Phase 7. Foliar discolouring was widespread in crops of both local and high yielding varieties. The zigzag leaf hopper was present in most of the crops and because it is a vector for a specific virus the disease was postulated as being caused by the orange leaf virus. This disease was also present in the lowland areas during the early months of 1983 and a "pool" of viruses and vectors in these areas could pose problems for the upland areas unless proper insect control techniques are used.

Despite all of the recent problems with blast, rice has been a very successful crop for the farmers to grow in terms of yield and income. This is reflected in the repayment percentages shown earlier in Table 1. When credit was first made available to grow HYV rice, the yields obtained by the farmers jumped from the 1978 surveyed estimate of 1.0 t/ha to average MCP cooperator yields of over 3.0 t/ha. In Phase 7 estimated average yield dropped to 1.8 t/ha because of the severe rice blast outbreak. There was also a concurrent drop in the percentage of farmers achieving break even yields.

These yields compare favourably with the results of small plot trials conducted by the MCRP. The absolute yield weights are difficult to compare because in Phase 1 and Phase 3 the research evaluations were conducted using IRRI recommended fertilizer rates containing nitrogen levels well below those recommended by the MCP (Table 2). The moisture content in the farmers yields is also much higher than the research standardised 12% but when it is realised that the farmers achieve only 20–40% of the yields achieved by researchers in crops such as corn and mungbean (refer Chapters 11 & 12) these results are extremely encouraging.

TABLE 2

RICE YIELDS OF RESEARCH TRIALS AND PRODUCTION AREAS

Yield (t/ha)

	1979(Phase 1)		1980(Phase 3)		1981(Phase 5)		1982(Phase 7)	
	BRS*	PROD	BRS*	PROD	BRS**	PROD	BRS**	PROD
Variety C 22	1.7	3.4	2.4	3.7	3.5	3.4	2.8	2.2
Ri 5	1.0		3.6		4.6		2.5	1.8
IR 54	1.9		3.1		4.3		4.1	1.1

* Fertilizer = 60:60:60 kg NPK/ha
** Fertilizer = 100:40: 0 kg NPK/ha

Rice also grows extremely well under partial shading. A number of production crops under coconuts yielded as much as rice growing nearby in unshaded areas (ZDSDP 1982). Many farmers have accepted that rice is the production crop best adapted to growing under coconuts and the area of native and improved varieties of rice in these areas has visibly increased over the last few years.

Delayed weeding reduces rice yield.

DISCUSSION

Traditional rice varieties have been successfully grown by some farmers for a number of years in ZdS. Although the yields are not high, commodity and labour inputs are generally low. However, when farmers attempt to achieve high yields with improved varieties, they are not successful unless they adhere to the recommendations on land preparation, time of planting, time of weeding, fertilizer rate and the timing and correct concentration of pesticide applications.

Approximately 47% of the cooperators leave the Multiple Cropping Programme at the end of each Phase. The major reasons for leaving are low yields, low profitability and high cash input needed for labour. Excepting for Phase 7 many of the farmers discontinued growing HYV rice under MCP conditions because of the high labour input needed to weed the crop early in the season. A cash allowance is not given in the MCP loan for labour hire. However, there are currently discussions with the participating bank (Land Bank of the Philippines) to release funds for this purpose. It is also noticeable that in some areas farmers have organised themselves into work groups to overcome labour shortages. Hand held implements that have been proven to reduce weeding times are presently being promoted by the agricultural engineering section of the MCP. The adoption of the hoe and the three and five pronged cultivator by farmers, will further reduce the need to hire labour.

Labour shortages also occur at harvesting. Individual farmers and their families are able to thresh the low yielding traditional rice crops by hand or by rolling the harvested material underfoot. However, threshing 3-4 tonnes/ha crops by this method proved to be too time consuming and the MCP provided 6 small, locally made, engine driven, mechanical threshers to overcome the problem in the major MCP upland rice producing areas. These machines are expensive to run and require constant repair. The Agricultural Engineering Section of the programme is now evaluating a low cost pedal thresher for use in isolated areas. Lowland rice threshers are also moving into the upland to thresh on a contract basis.

A small upland rice thresher is evaluated.

The future for upland rice production in ZdS is promising. Traditional varieties have an aroma and flavour for which buyers pay a premium. Many farmers continue to grow these varieties and an increasing number are using low inputs to improve yields. The production of HYV's using high levels of inputs had a severe setback in Phase 7 when rice blast devastated the crops but rice blast will not be a problem every year and the Phase 9 crops are promising to yield well. Rotation of varieties and the breeding of blast resistant lines will reduce the major effects of the pathogen.

The marketing of rice is one problem ZdS will not face for a number of years. The Province produces a high quality grain which is not blemished by typhoon induced floods. This grain is suitable for export from the Philippines. However, at present most of the production is either consumed within the Province or exported to other parts of Mindanao and to the Visayas.

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CORN

Anthony K. Kirwan - Production Agronomist

Corn is one of the most important crops in the Philippines because about 20% of the population use it as a staple food. The crop is grown throughout the country where, in spite of the favourable climate and available technology, production is not adequate to meet the need for food, feed, seed, and industry.

The Philippine Government, recognizing this deficiency has attempted to increase production by implementing 3 national programmes. These programmes were:

(i) MAISAN 55 (1975-1977)
(ii) MAISAN 77 (1977-1981)
(iii) MAISAGANA (1982-present)

Zamboanga del Sur has been included in all three programmes and farmers in many of the upland areas have accepted loans to grow the crop. Many of these areas were considered suitable for corn because a large proportion of the people who settled in the areas already grew corn as a staple. These people originated from the Visayas where their staple diet was corn and this was the practice they continued in their new environment in Zamboanga del Sur (ZdS).

The Zamboanga del Sur Development Project through the Multiple Cropping Production Programme (MCPP) includes corn as one of its target crops because of its importance both locally and nationally. Province specific research for corn production began at Betinan Research Station (BRS) in 1978 and was still continuing in 1983. It was felt that recommendations for national corn programmes are almost certainly based on trials conducted in Luzon or in other parts of the world and in some ways were unsuited to ZdS. Varietal trials, fertilizer studies, weed competition studies, pest control studies and time of planting trials have all been completed at BRS. At the levels of fertilizer recommended for the programme it was found that there was no advantage to be gained from using hybrids as yields were generally over 4 tonnes/ha. The national corn programme (MAISAGANA) has similar fertilizer levels to MCPP for open pollinated varieties but recommends higher levels for hybrids.

In Phase I of the MCPP credit programme (1979) corn was actively promoted in line with national goals. The average yield of 127 farmers was only 1.23 tonne/ha. On this basis the crop was not worthy of financing and was withdrawn while the problems were reassessed. It was reintroduced into the programme in Phase 6 (1981). 39 farmers averaged only 1.01 tonne/ha. Table 1 compares farmer and research yields for yellow corn.

TABLE 1
YIELDS OF YELLOW CORN

PHASE	1	2	3	4	5	6	7	8
Farmer Yields t/ha	1.23	-	-	-	-	1.01	1.55	1.37
Research Yields t/ha*	-	4.28	-	4.80	1.79	1.84	-	6.27
* IPB Var 1.								

Meanwhile the national corn programme had been having similar problems even though their areas were considered more suitable for corn production. Yields achieved in the national programme are shown in Table 2.

TABLE 2

ZAMBOANGA DEL SUR MAISAN 77 AND MAISAGANA CORN PROGRAMME - SOME AVERAGE YIELDS.

	HYBRIDS	IPB VAR I	WHITE CORN
1st CROPPING 1981		1.5	1.4
2nd CROPPING 1981		1.4	1.3
1st CROPPING 1982	3.17	1.4	1.37
2nd CROPPING 1982	3.9	1.1	

All of these yields are below the calculated break even point.

Some of the PROBLEMS with GROWING CORN at the HIGH TECHNOLOGY LEVEL have been:

1. Corn stem borer.
2. Difficulty of grain drying during the first cropping.
3. Poor husk cover and ear rots.
4. Drought in the second cropping.
5. Late planting in both croppings.

When all these problems are put together corn, at the high technology level, is a difficult crop to grow for a peasant farmer. This becomes more obvious when one considers that many of these same farmers have little difficulty adopting upland rice technology packages and can obtain crop yields as high and sometimes higher than research station yields.

The adoption of high technology packages is far more rapid where farmers have access to irrigation and fertilizer or where conditions are similar to research stations (i.e. climate, drying facilities, easy access to chemicals etc.). Although rice research trials and production levels have been similar it has become apparent that high technology packages for corn are not consistent with the means, needs and resources of low income upland farmers. In our opinion a successful corn programme requires a shift away from the strict production orientation of the national programme towards producing plant types and/or crop management techniques which are better adapted to the Zamboanga del Sur environment.

Overcoming the difficulties is largely an extension problem although not directly technology oriented. First of all the MCPP team feels that during the first cropping upland rice is a far more suitable crop than corn especially at high technology levels. Often after the harvest, drying of corn is difficult, especially with a large yield and the corn begins germinating or moulds develop before drying can be completed. This is not a problem with rice because of the dormancy period after harvest.

Secondly corn borer can be a serious problem during the first cropping. Research at BRS has shown that this is best overcome by early planting.

This is certainly true in field production terms but plantings are invariably staggered as local rainfall varies. The inevitable result is a build up of corn borer with often disastrous results. The problem can be avoided by planting corn in the second cropping when insect pests of corn are less of a difficulty. Ear rots are also avoided by planting in the second cropping.

In general it is felt that high technology corn is a better proposition in the second cropping despite time of planting research yields which show the optimum planting time to be in the first cropping. In the two most recent second croppings the rainfall pattern has varied because of the early seasonal finish. However, if the corn is planted before the end of September excellent yields have been obtained. It is only when planting is delayed into late October that drought is a problem. From an extension viewpoint high technology corn packages are easier to promote in the second cropping.

Most of the corn farmers will continue to grow the local varieties with low to zero fertilizer levels whether or not they have loans for high technology programmes. These varieties will always give some yield planted during the first or second cropping. The low fertilizer levels appear to make them less susceptible to insect infestations and the cobs are tightly sheathed which prevents ear rots. The lower yields also mean that drying is less of a problem. Slight technology alterations, for example drilling seed instead of planting in hills may raise yields.

There is an obvious economic advantage to growing corn at the lower input levels when crop management is simple, economic inputs are small and some yield will result.

High technology corn packages have a role to play in terms of national goals but their suitability to small upland farmers should be examined closely. Corn will continue to be grown for staple diet requirements but more suitable alternatives should be considered for profit purposes.

MUNGBEAN

Robert J. Cogger - Research Agronomist

INTRODUCTION

Before the ZDSDP Multiple Cropping Project (MCP) commenced farmers grew local varieties of mungbean of indeterminate habit. Fertilizer and pesticides were rarely used. Small areas only were planted. Farmers reported that the area was not expanded because of lack of available seed and lack of technical advice. Many farmers had discontinued production because of pest problems and poor yields. (Denning 1980).

OBJECTIVES OF THE PROGRAMME

Farmers commenced growing mungbean within the Multiple Cropping Production Programme (MCPP) in 1977, using best available recommendations and registered seed of a variety new to Zamboanga del Sur, Pag-asa I (CES-1d-21). Although farmers were obtaining satisfactory yields from this technology, it was considered desirable to commence some location - specific research into the crop. Research commenced at Betinan Research Station in the second cropping period of 1978. Varietal evaluations and studies of fertilizer, weed control, insect and disease control, time of planting, soil fertility and crop competition have been conducted.

EVOLUTION OF THE PROGRAMME

Mungbean has been included in the MCPP Credit Programme since Phase I, 1979. Recommendations for its culture have been altered as the results of research became available. The major changes have been to the fertilizer rate, and the chemicals recommended for insect pest control. Yields in Phase 1 and 2 were quite high, those of Phases 3, 4 and 5 were significantly lower, and 6, 7 and 8 being significantly lower still (refer Table 1).

TABLE 1

MUNGBEAN YIELDS
t/ha.

MCP Phase	1	2	3	4	5	6	7	8
Farmers Yields (Pag-asa I)	0.76	0.72	0.64	0.65	0.65	0.42	0.38	0.43
Research Yields (Pag-asa I)	-	0.34	-	1.18	0.76	-	1.08	-

A number of reasons have been suggested for the declining farmer yields including technology failure; poor quality, unselected seed; the development of resistance to insecticides by pod borer; and the possiblity of poor quality insecticides being sold. The most likely reason is failure to correctly apply the technology. Some farmers who generally follow the recommendations have been able to obtain high yields over a number of years. These farmers plant into weed free conditions, maintain a weed free crop, apply all of the fertilizer, and spray the recommended rate of insecticide at the correct time. The farmers who obtain low yields fail to correctly implement one or a number of the recommended practices (Ole, pers. comm.).

Farmers continue to grow mungbean both within or outside the production programme, despite declining yields. They continue to grow the crop because:

i) It has a two month growing period this being shorter than any other available crop and so generates a cash inflow relatively early in any cropping period,

(ii) It's short maturity period allows it to be planted on surplus land towards the end of the growing season e.g. mid to late October. This practice is not recommended by the programme but is followed by farmers. It provides a source of revenue from land which would otherwise be non-productive. Mungbean is also grown on rainfed lowland rice areas in the period December to March for the same reasons;

(iii) The crop is readily marketable.

Applications for loans to grow mungbean within the MCPP have declined during 1983. Farmers have apparently recognised that the higher returns from other crops e.g. rice, soybeans and peanuts make them more attractive than mungbean.

Two general factors are reported as constraining yields; insect pests and climatic conditions. The pod borer (Maruca testulalis) is the most frequently reported pest. Control can be achieved by the timely and correct application of insecticides. A number of chemicals have been recommended since 1977. The current recommendation is Methomyl (Lannate L). The use of chemicals necessitates the use of sprayers which are not readily available in upland areas. Since all green gram varieties appear to be equally susceptible, yields will continue to be limited by the farmer's ability to control the pod borer by the use of insecticides. Some of the black gram varieties, particularly c.v. Regur, appear to be somewhat resistant. However, there is a reluctance on the part of farmers to eat the black seeded grams.

Climatic conditions, particularly heavy rain, waterlogged soil and strong winds, are also reported as causing yield losses. Heavy rain during the month of June may cause harvest losses in early planted crops and often results in a poor quality sample being produced. Heavy rains in August or September may limit seedbed preparation, thereby increasing weed competition in the second planting season. Drought is also reported as reducing yields, especially with late plantings.

DISCUSSION

Experience with mungbean has been different from that of other crops recommended by the MCP. The differences are that the introduced variety has become widely accepted and is grown and consumed by the local community, whilst the local varieties have decreased in importance. Mungbean is being grown by a large number of farmers outside of the credit programme who follow the basic recommendations of the MCP. In mungbean we have witnessed an example of farmers accepting a crop on their own terms, and adopting those parts of the recommendation that they see to be appropriate. The result has been that yields have declined, but farmers continue to grow the crop.

REFERENCE

DENNING, G.L. 1980. Rainfed Cropping Systems in Zamboanga del Sur: A farm survey. Zamboanga del Sur Development Project, Pagadian City, Philippines.

SOYBEANS

Anthony K. Kirwan - Production Agronomist

Soybeans have been grown in Zamboanga del Sur (ZdS) for many years using local varieties with low levels of inputs. The produce is generally used for coffee making and some home consumption. However, national demand has grown in recent times to the extent that a large soybean mill was completed in Batangas Province in 1980 and a national soybean programme was launched in 1982.

This national demand and the perceived profitability of the crops stimulated a desire to include it in the Multiple Cropping Production Programme (MCPP). Research results at Betinan Research Station (BRS) in 1978, 1979 and 1980 indicated the varieties best suited were ORBA, BPI Sy 2 and Clarke 63 which all yielded over 2 tonnes/ha. Fertilizer levels were adapted from mungbean research results.

The variety chosen for cropping loan releases was Clarke 63 and releases commenced in September 1981. The results from Phase 6 were:

TOTAL NUMBER OF FARMERS	89
AVERAGE YIELD - CLARKE 63	300 kgs/ha.
AVERAGE PRICE	₱ 3.77/kg
AVERAGE TOTAL INCOME	₱ 1131/ha.
LOAN REPAYMENT	₱ 900
GROSS PROFIT	₱ 231
NET PROFIT	NEGATIVE.

The yields at the same time on BRS were 1.23 tonnes/ha. The venture into soybeans as a small farmer credit proposition was considered a failure.

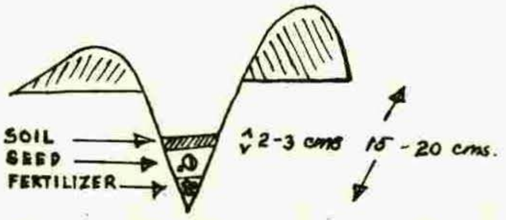
REASONS FOR LOW YIELDS

(1) VARIETY

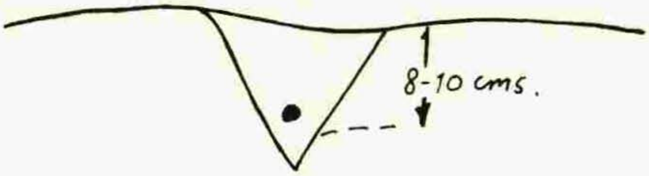
Although Clarke 63 has yielded consistently well in BRS research trials it has been rejected in other soybean production programmes. (e.g. in South Cotabato). Other varieties (BPI Sy2 12A and ORBA) which were not significantly different in BRS research trials to Clarke 63, were chosen for those programmes because certain crop characteriestics (height, semi-indeterminate flowering) made them more acceptable for use by small farmers. The production programme introduced these varieties to ZdS on a production demonstration level and for crop releases during 1982.

(2) DEPTH OF PLANTING

Depth of planting was the most serious problem during the cropping. Furrows were opened using a mouldboard plough and fertilizer placed into the furrow and covered.



The seeds were then placed in the furrow and covered to the recommended depth of 2-3 cms of soil. In many cases heavy rain followed planting with the inevitable result that furrows were filled in and the seeds buried too deeply.



(3) LAND PREPARATION

MCPP Phase 6 recommendations stated that land should not be cultivated to a fine seed bed as this would leave the area susceptible to erosion. Farmers, being used to the strong germination characteristics of mungbeans, did not prepare the land sufficiently for soybeans further lowering the emergence percentage.

(4) SEED QUALITY

The quality of soybean seed was unsatisfactory. Soybeans, planted for seed during the first cropping, were maturing in August when seed drying was difficult. Moulds, soft seed and difficulty of threshing all had their effects on seed quality.

(5) ROW SPACING

Another of the MCPP recommendations was for crops to be planted at 50cms. At this spacing during Phase 6 all soybean crops were hand weeded. Although the mini-furrower was recommended to ease labour problems in weeding no farmers used them because of the cost. Some mungbean farmers (e.g. at Dimataling) had widened their rows to 60 cms and weeded using a mouldboard plough. It was thought that a similar technique with higher yielding soybeans could be successful.

SOLUTIONS

(1) FIRST CROPPING 1982

Despite the problems anticipated with the drying of mature grain the programme decided to proceed specifically in an attempt to overcome the depth of planting problem.

The land was prepared much as before with the addition of an extra harrowing. The planting furrow was opened with the use of a mini-furrower which after fertilizaton and planting, would leave the land reasonably level and enable good seed to germinate and emerge even after heavy rainfall.

BPI Sy2 12A seed was imported from South Cotabato to overcome the seed quality problems. The plant population recommended there was similar to MCPP but at a row spacing of 60 cms (10 cms wider). The main reason for this was for ease of interrow cultivation. Before Phase 7 began the MCPP technical committee agreed to a row spacing of 60 cms provided the plant population remained at about 400,000 plants per hectare. Research into the effect of row spacing on yield was commenced in 1982.

A total of 13 farmers from 2 barangays volunteered to test the technology each on 1/2 hectare. The programme took one step backwards to the demonstration phase whereby crops were placed under farmer management with technician supervision and financed from ZDSDP development funds.

The results were considered a success because of the high germination percentage and the good crop stands that were obtained. One barangay averaged 1.6 tonnes of grain/hectare whilst the other averaged only .23 tonnes. The average yields in the second group were low because they were harvested during heavy rainfall and two suffered from soybean mosaic virus. Control of aphids, which carry the disease, is an important aspect of soybean production in the Province.

Interviews with farmers suggested that they were pleased with the technology but thought that soybeans were better suited to the second cropping when drying was easier.

(2) SECOND CROPPING 1982

The programme decided that farmers should be granted cropping loans for soybeans during Phase 8. The mini-furrower was included in the budget at a subsidized price but not made compulsory for those farmers who understood the importance of depth of furrows. Using the mouldboard plough to open a furrow required that after fertilization and before planting most of the furrow was filled in. Another method used is to tie a rope around the plough blade which prevents it digging in too deeply. The important result was that the land would be reasonably level after planting.

The Phase 8 results were:

TOTAL NUMBER OF FARMERS		22
AVERAGE YIELD	ORBA	1020 kgs/ha
	CLARKE 63	702 kgs/ha
	AVERAGE	861 kgs/ha
AVERAGE PRICE		₱ 3.95
AVERAGE TOTAL INCOME		₱ 3,400
LOAN REPAYMENT		₱ 900
GROSS PROFIT		₱ 2,500
NET PROFIT		₱ 1,031

The yields at the same time on BRS were 2.27 tonnes.

Soybeans will be released again in Phase 10 when the target will be 100 farmers.

MANAGEMENT PROBLEMS

(1) INOCULATION

It appears that efficient nodulating strains of Rhizobium for soybeans do not predominate in the soil of ZdS. Preliminary research has shown that imported inoculum has a higher success rate than local inoculum. This has yet to be confirmed. Preliminary fertilizer experiments indicate that some N and P are necessary for optimum growth (24 kg/ha. of N and 30 kg/ha of P) particularly when obtaining viable inoculum is a problem.

(2) THRESHING AND MARKETING

Machine threshing of all crops creates a problem in ZdS because of the non-contiguity of upland farmers. Phase 10 releases will be limited to 1/2 hectare per farmer so that hand threshing is still realistic.

In the past most produce has been sold to the traders and in Phase 8 this was at the Government support price level. Problems have been encountered with the government marketing authority regarding purity percentages. The definitions are being examined with a view to reinterpretation especially considering that the number of farmers growing the crop will increase in the coming Phases.

(3) SEED STORAGE AND SUPPLY

Seed quality is better after the second cropping than the first because weather conditions are favourable for drying. Storage facilities have improved, with the completion of an air conditioned bodega, so that maintenance of seed quality is much less of a problem.

PEANUTS

Robert J. Cogger - Research Agronomist

INTRODUCTION

Farmers were growing peanuts before the Zamboanga del Sur Development Project (ZDSDP) commenced. The scale of production was relatively small, with simple technology and few inputs. The main problems reported by farmers were the lack of available seed, pests, lack of technical advice, insufficient labour and low yields.

Peanut is a legume, producing seed of high protein and oil content, and is readily marketable. It was felt that it was a suitable crop to be included in the credit programme. Peanut was first grown by cooperating farmers in 1977, using local seed and following management recommendations imported from other parts of the country.

EVOLUTION OF THE PROGRAMME

The research programme commenced in 1978 with screening of peanut varieties. Time of planting and fertility studies were also conducted in 1979 and 1980, whilst fertilizer studies were conducted in 1980, 1981, 1982 and 1983. Yields of peanut achieved at the Research Station are often in excess of 2.0 t/ha, indicating the potential productivity of the crop. Peanut has not responded to fertilizer when grown on red-brown volcanic soils. Significant yield responses have been achieved from added nitrogen and phosphorus on the low fertility soils derived from sedimentary materials.

Results have indicated that peanut yield is not affected by time of planting. Grain quality and ease of harvest are affected by weather conditions at ripening and following harvest. Wet conditions make it very difficult to harvest the peanuts and pods often rot in the soil. Rainy weather after harvest makes drying difficult resulting in mouldy seed unacceptable to the market.

No major insect pests have been identified, except for the White Grub which has been observed in a number of fields throughout the Province. Rats are also reported as being a major problem.

Cercospora leaf spot and rust have been observed, but have not been reported as causing major yield losses. The major disease is bacterial wilt, suspected to be caused by Pseudomonas solonacearum. There appears to be no varietal resistance to the disease. Bacteriacides have not been screened but are usually uneconomical for use in soil. The present recommendation is not to plant where the disease has been reported.

Varietal screening has indicated those varieties well adapted to the conditions prevailing (Accession 12, UPL PN2, and Mocket), although local varieties also yield well in variety evaluations. A number of varieties have been screened under coconut shade. Yields were depressed to 40% of that achieved in open area.

Farmers have been growing peanut in all phases of the production programme. Average yields have ranged from 0.4 t/ha to 1.3 t/ha however, some farmers have achieved yields in excess of 1.8 t/ha.

TABLE 1

PEANUT YIELDS
t/ha

MCPP PHASE	1	2	3	4	5	6	7	8
Farmers Yields (Local Variety)	1.05	1.15	1.29	0.83	0.70	0.52	0.42	0.71
Accession 12(Research Station)	-	3.01	-	2.61	-	1.68	-	2.61

PROBLEMS AND FUTURE

The number of farmers growing the crop has not increased as rapidly as with other crops such as upland rice. The primary reason for the slow rate of expansion of credit financed peanut crops is the continuing lack of available good quality seed. The recommendation of 250,000 plants per hectare requires that farmers have 130 kg of unshelled seed for planting. This presently costs ₱715/ha. Another possible reason is that farmers may realise that peanut is a low (chemical) input crop and can be grown without resorting to sources of credit.

The programme is attempting to multiply and distribute seed of recommended High Yielding Varieties (HYV) - including Accession 12, Mocket and UPL PN2. Thirteen tonnes of HYV seed will be available to the credit programme in Phase 10.

Insecticides have been screened to assess their efficacy against White Grub but are probably uneconomical at this stage.

The lack of technical advice has to a large extent been reduced by the results obtained from the research programme. It is now a matter of training extension agents, and farmer education.

Labour problems associated with weeding have to a large extent been reduced by the various weeding implements sponsored by the Project. The labour demand at pre-planting (shelling) and at harvest remain areas in which engineering work is required.

Observations suggest that the low yields reported by farmers have been due to them not obtaining satisfactory plant populations.

The reasons may be incorrect row spacing and poor seed quality. High yields can be achieved provided that populations of 200,000 to 250,000 plants per hectare are established. The failure to control weeds is probably another reason for low yields.

Technology has been developed which will allow farmers to obtain profitable yields from peanuts. Peanut is a crop suited to all conditions, particularly for farmers who do not wish to undertake credit through a government programme. It thus appears to be the legume most suited to the greatest number of farmers.

UPLAND FOOD CROP SYSTEMS

Robert J. Cogger - Research Agronomist

INTRODUCTION

The upland farmers of Zamboanga del Sur (ZdS) have adopted a large number of cropping patterns. Denning (1980) identified 13 separate open area upland cropping patterns and 20 separate patterns being followed under coconuts. The corn-corn or rice-corn patterns are the most common. It is also common for only one crop to be planted, this being in the first cropping period starting in April. If two crops are sown it is common for a significantly smaller area of land to be planted in the second cropping, starting in September.

Legume field crops are not widely or frequently grown with only peanut and mungbean being commonly seen. The most common root crops are cassava and sweet potato. Intercropping of annuals is not a common practice although annual cropping under coconuts is common. Fertilizers, improved varieties, insecticides and other inputs are rarely used.

Erosion control practices have not been widely adopted, with the result that many slopes have lost much of the topsoil. There are indications that one metre of soil has been lost from some hillsides (Pain pers comm). Yields have steadily declined since permanent upland cultivation commenced in the 1950's. Farmers have reported an 80% decline in corn yields over twenty years (ZDSDP 1978). Tolentino et al (1983) reported cases of corn yields declining by as much as 46% over a five year period.

THE OBJECTIVE

It was within this environment of declining yields being obtained from a rapidly eroding landscape that the Multiple Cropping Project (MCP) decided to give priority to the development, evaluation, and dissemination of more productive and stable cropping systems for the rainfed areas of the Province. The aims were to stabilise food crop production and increase farm incomes.

The project staff have defined cropping systems to encompass those crop sequences and patterns and erosion control practices, available for adoption by a farmer. These interact with farm resources, other farm enterprises, and the available technology to determine the make-up of the cropping system.

The cropping systems, developed or proposed, need to satisfy two major requirements. The first to achieve a reduction in the rate of erosion and decline in soil fertility; and the second to increase crop yields and net farm income. These requirements need to be achieved within the limitation that the system must be able to be managed and implemented by the farmer, given the scarce resources available to him.

THE APPROACH

To achieve these aims, a multifaceted research programme was implemented, with the tasks of identifying adapted species and varieties, developing appropriate management systems for each crop, integrating adapted crops into manageable cropping patterns, and incorporating cropping patterns into an erosion control system.

Previous chapters have described how a large number of species were screened under the climatic conditions in ZdS. Further studies on promising species determined the optimum time of planting, and crop effect on soil fertility. A short list of crops was then subjected to detailed study. Studies included response to fertilizer on different soil types, pest and disease control, weed control and plant population effects. Other investigations attempted to develop more efficient methods and implements for weed control. These basic experiments generated a wealth of knowledge about individual crops and allowed the production of recommendations for individual crops.

Further studies were started to identify alternate, low cost sources of nutrients and alternative management systems. These studies include mulch studies and ipil-ipil strip cropping experiments. Concurrently a search of the literature and discussions with other groups within the Philippines revealed appropriate methods to incorporate annual cropping with strips of trees, as a means of erosion control.

The first major experiment on cropping patterns was established in 1980. The aim of the experiment was to determine the maximum number of crops that could be grown in any one year and to compare cropping patterns with various cereal to legume ratios. As many as five crops were attempted, with legume numbers ranging from zero to three. The results of the study were reported by Baltonado et al. (1983). The experiment indicated that patterns commencing with either rice or corn were limited to two crops per annum. It is possible to plant three crops per annum with patterns commencing with legumes and based on minimal tillage for rapid turn-around between crops. The experiment failed to define any benefits from the use of legumes, however, any potential benefits were probably masked by the high rates of fertilizer used. The experiment was discontinued after the 1982 cropping year but a further experiment with a reduced number of patterns, and various fertilizer levels, was established in May of 1983.

Five of the above cropping patterns were further investigated on a larger scale. These patterns have been tested on farmer's fields since 1981. On-farm monitoring involves the cooperating farmers in the task of implementing the cropping pattern on plots of one tenth of a hectare. The patterns are therefore being tested in terms of agronomic applicability as well as farmer manageability.

OUTCOMES

Two basic types of cropping patterns have been identified.

The first are cereal based patterns commencing with either a rice or corn crop planted in April or early May. This crop is followed by a second crop planted no later than mid-October. The second crop can be either a legume (mungbean, soybean or peanut), or a cereal (corn, or possibly sorghum). The possibilities for planting a third crop in these patterns are low due to the risk of drought from the latter part of December through to March.

The second type of pattern are legume based. The best pattern tested is mungbean-peanut-corn. This pattern is based on planting into a clean seedbed and having good weed control during the growing period. This pattern has been successfully tested by farmers. It is adapted to the prevailing climatic conditions, and is more profitable than the two crop patterns. It has the added advantage that it relies on minimal tillage, resulting in the soil being left exposed for short periods only, therefore reducing the risk of erosion. It is being further tested by a larger number of farmers during the present cropping year.

Benefits have been shown to result from the use of organic mulches and strip cropping with ipil-ipil (Abrenica and Wells, 1981, G. Dofeliz et al, 1983). Experience of other workers in Mindanao (Watson, pers comm) have indicated the erosion control benefit of cropping annual and perennial species between alleys of ipil-ipil; the technology being called Sloping Agricultural Land Technology (SALT).

The main result of the MCP has been the identification of cropping patterns appropriate to the open upland areas, and methods by which erosion can be reduced. The proposed cropping patterns are capable of increasing farm incomes significantly above those presently achieved whilst the alley cropping systems will significantly reduce the rate of erosion and stabilise food crop production.

CONSTRAINTS TO ADOPTION

Experience has shown that the technologies developed for individual crops and cropping patterns, require that the farmer be willing to do more work, especially in terms of better seedbed preparation and weed control. Farmers have reported that one reason why they drop out of the Multiple Cropping Production Programme (MCPP), is that the amount of effort involved in following the technology is not met by the returns. Monitoring has also identified that only those farmers who follow the technology completely obtain high yields and that farmers who obtain high yields are those who plant smaller areas to MCP crops. It is therefore likely that the improved cropping patterns will not be generally accepted until such time as the farmers feel the need to work harder, in order to obtain higher yields.

It is envisaged that farmers would adopt two cropping patterns, one of the cereal based patterns and the second legume based. These patterns would be applied to alternate alleys or strips down the slope. Experience of on-farm monitoring sites has been that farmers find it difficult to adequately manage more than one pattern. Therefore rapid farmer adoption of this form of diversification is not expected.

A further constraint to adoption by farmers is that the systems require that the farmer own or have ready access to a carabao, and that he have access to either family or outside labour for weeding. Approximately 40% of farmers do not own a carabao, thus limiting their ability to implement the patterns, whilst family or outside labour is not always available when required. Until such time that carabao become universally available, and there is a readily available supply of labour, the most intensive cropping patterns will not be appropriate to all farmers.

The system of using tree crop alleys may take a number of years to be accepted. Although farmers sometimes express concern about erosion and declining yields, very few of them have made any effort to implement even simple erosion control practices. The idea of planting strips of trees, which will be regularly cut back and used as a mulch is a major change and as such will take a number of years to become accepted.

DIFFICULTIES EXPERIENCED WITH ON-FARM MONITORING

The major difficulty experienced has been to ensure that we assess the farmers' ability to implement the technology, and not the ability of the researcher to either cajole the farmer into doing the work, or the ability of station or hired labour to carry out the operation. The researcher is often tempted to implement strategies and incentives in order to ensure that the pattern or technology is implemented, and thus achieve "a successful result". If this occurs the pattern is not being tested and farmer applicability and acceptance is distorted.

The identification of potential cooperators is also a problem. The criteria for farmer selection have yet to be finalised. As an example of the problem - should a farmer without a carabao be accepted as a cooperator? A significant number of farmers do not own a carabao, yet the patterns rely on rapid turn-around, which necessitates a carabao.

For accurate data to be obtained, a number of monitoring sites need to be established. This makes it absolutely essential that the researchers involved have ready access to reliable means of transport. The minimum requirement is a motorbike. On those occasions where transport has not been available the monitoring of farmer activity has suffered.

A further problem experienced is the poor keeping of records of management data. Quite often the researcher is unable to be present when activities take place, and the farmer's memory can not be relied on. It is essential that the farmer be given some means of recording activities, such as the number of people involved and the time taken. Without this being made available management data is inadequate.

FUTURE

The short term future will involve the continued monitoring of cropping patterns and alley cropping, with the aim of collecting further data as well as exposing more farmers to the technologies being proposed.

Attention will need to be given to areas of food crop production that have not yet been investigated. These include developing food crop systems applicable to coconut lands; the screening and distribution of fruit trees adapted to the Province; and the development of vegetable production technologies appropriate to farmers.

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TOOLS & MACHINES FOR UPLAND CROPS

Bruce J. Short - Agricultural Engineer

INTRODUCTION

The agricultural sector in Zamboanga del Sur (ZdS) is dominated by small farms, most of which are less than two hectares and have limited road access. Development strategies must be firmly focused on overcoming the problems of these small scale farmers. The utilization of agricultural engineering to solve these problems depends on two main considerations:

(i) The level of technology and
(ii) the type of technology best made available to small scale farmers.

In the Philippine context, hand tool technology must be supplemented with animal draught technology, wherever appropriate and feasible, or with mechanical power wherever practicable and under conditions that do not favour animal use. Consideration should be given to environmental and physical factors, availability of energy supplies and labour resources, socio-economic conditions of farmers, and the development of rural institutions to support co-operatives, extension, credit, supply-service networks and others (Dalisay 1982).

OBJECTIVES

The programme aims to:

(i) Assist in developing tools, implements and technology appropriate for small farm production.

(ii) Assist local industry to manufacture and service this equipment.

(iii) Improve the capability and capacity of the Ministry of Agriculture (MA), farmers and others to identify agricultural engineering problems and find solutions.

TRADITIONAL TOOLS AND TECHNIQUES

A. Land preparation and weed control

The upland farmers of ZdS have three basic tools and implements for land preparation and weed control.

1. The Mouldboard Plough (Vargas type).

The Vargas plough is well constructed and more advanced than many ploughs found in other parts of the Philippines e.g. wooden frame ploughs from Cavite, Luzon. The design of this implement is common throughout the Province. It is made of steel and is readily constructed by most blacksmiths with the beam being reused many times. The wearing point or share is fashioned from broken truck springs and replaced several times before the main mouldboard has to be remade.

It is used for primary and subsequent ploughings, furrowing, seeding and for weeding. The weeding operation is more specific to corn but can be used for other crops. It consists of two separate passes:

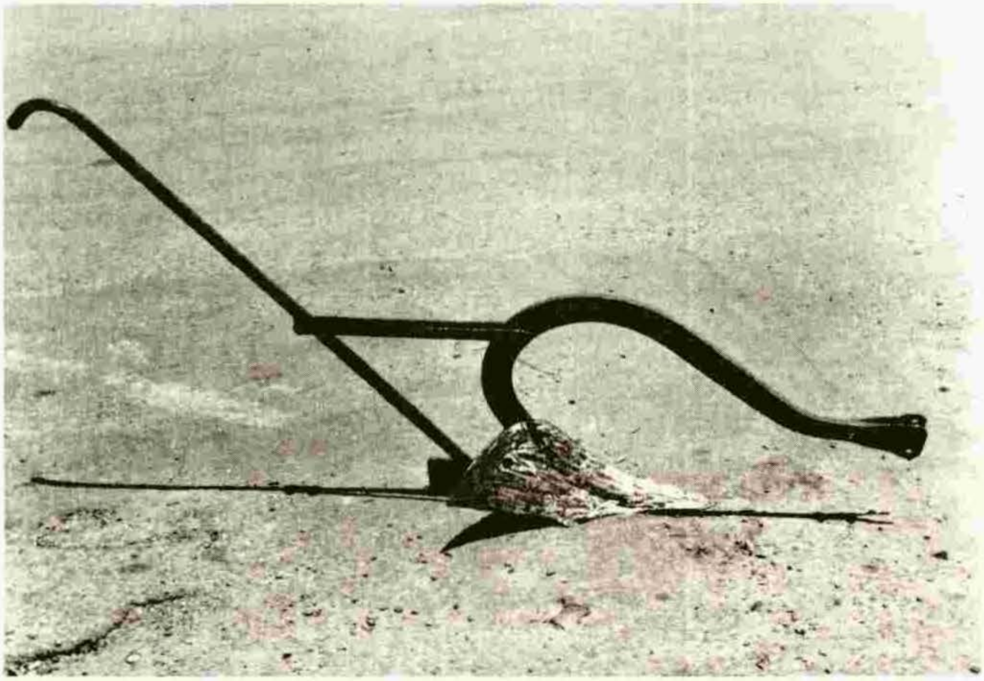
(a) Off-baring, whereby soil is thrown away from the planted row at a recommended 15 days after emergence.

(b) Hilling-up at 25 days after emergence, when the soil is thrown back around the plants, thereby smothering the weeds within the row.

Timing of these operations is very important for two reasons:

(a) To prevent root damage to the corn plant during off-baring.

(b) To achieve an effective weed smother within the row during hilling up.



Single furrow mouldboard plough

2. The Peg-Tooth Harrow.

This simple implement is constructed from timber and steel spikes (often mild steel bolts). Frame shapes include square, rectangular, trapezoid and triangular, but the operation is the same as for larger steel harrows used in advanced agriculture. Some blacksmiths are now making the harrow totally of steel. The initial cost is higher but the life of the harrow is almost indefinite. The harrow is used to break down large clods after the initial ploughings and for seedbed preparation. It may also be used for a final light weeding just prior to planting.

3. The Weeding Bolo or Bunlay.

This small hand tool is owned by every farmer in the Province. It is simply a flat piece of sharpened spring steel fitted to a wooden handle. This is the only tool available to many farmers, particularly those on the steep upland who practice the "kaingin" system of slash and burn or shifting agriculture, and who do not have access to a carabao. The bunlay is used to prepare the hillside, for hand planting and weeding.

Those farmers with carabao and ploughs still use the bunlay for hand weeding narrow spaced crops such as rice (25-35 cm) or mungbean, peanut and soybean (50-60 cm). The weeding bolo is the most commonly used tool in the Province.

The weeding bolo is the most common hand tool in the Province.

B. Harvesting and Threshing

Harvesting and threshing of upland crops has been traditionally carried out by labour intensive methods.

Maize is hand picked when dry, husked, then sometimes placed in the sun to dry further on the cob. It is later shelled by using either the fingers, or by rubbing the cob against a board which has been imbedded with metal studs.

Rice is harvested using a sickle (garab), then carried to the farmers house and threshed by foot. Some areas use the "hampasan" method whereby the rice is beaten or flailed against a slatted table.

Mungbean pods are hand picked, allowed to shatter in the sun, then foot threshed and cleaned.

The complete peanut plants are pulled, stacked for drying and then the pods are manually separated from the rest of the plant. Pod loss can be considerable if soils are hard and compacted at pulling time. The plough is sometimes used to assist pulling.

Solar drying is the only method available to small farmers. Grain is laid out on mats or concrete and turned regularly. This method does not require fossil fuel or capital outlay, however, problems occur during the wet season with regular rain and overcast conditions.

PROGRAMME DEVELOPMENT

The introduction of the Multiple Cropping Production Programme (MCPP) to ZdS has increased the level of technology and management. It has demonstrated the need for research into improved tools, implements, machines and techniques appropriate to the level of operation of the majority of farmers in the Province.

The lowland rice producing areas of the Province already have access to small farm machinery and technology developed by the International Rice Research Institute (IRRI) and other research organisations. The project target is the small upland farmer and consequently all activities have been directed at this group.

Agriculturists on the project had experimented with various tools and machines before the agricultural engineer commenced duties.

Much of the equipment purchased or developed early in the life of the project, while being useful to facilitate the operation of a research station is inappropriate for small farm usage. Such items include kerosene fired grain driers, mechanical threshers and seed drills. Small budget allocations to line agencies make the operation of such equipment on research stations also doubtful.

A small workshop was established at Betinan Research Station (BRS) and fitted with sufficient tools and equipment to produce and test prototypes, and to manufacture jigs, fixtures and templates for cooperating blacksmiths and manufacturers. Initial plans provided for the establishment of a fully equipped agricultural workshop within the MA complex in Pagadian City. However, a reduction in funding has caused this proposal to be reduced in scale. This facility will be used for future development work and basic skills training.

Weed competition and control experiments conducted at BRS during 1980-81 highlighted the need for better weed control in upland crops. Crops need to be weeded earlier than the existing practice and then kept weed free for a longer period (ZDSDP, 1980-81). Improved and faster methods of hand weeding were required but consideration had to be given to possible social implications if labour saving devices produced unemployment. The period 0-8 weeks after crop emergence, creates strong pressure on the available labour supply, often forcing up the price of daily labour. This is also the period when the farmers' cash reserves, if any, are lowest. Crops are often not weeded at the correct time because of:

(i) The farmers inability to pay the high daily rates or
(ii) the immediate shortage of labour.

The programme aims to introduce various hand tools, already in use in other parts of the world, which will allow farmers to weed earlier and faster without total dependence on hired labour. It is important to note that farmers would prefer to hire labour if it is available.

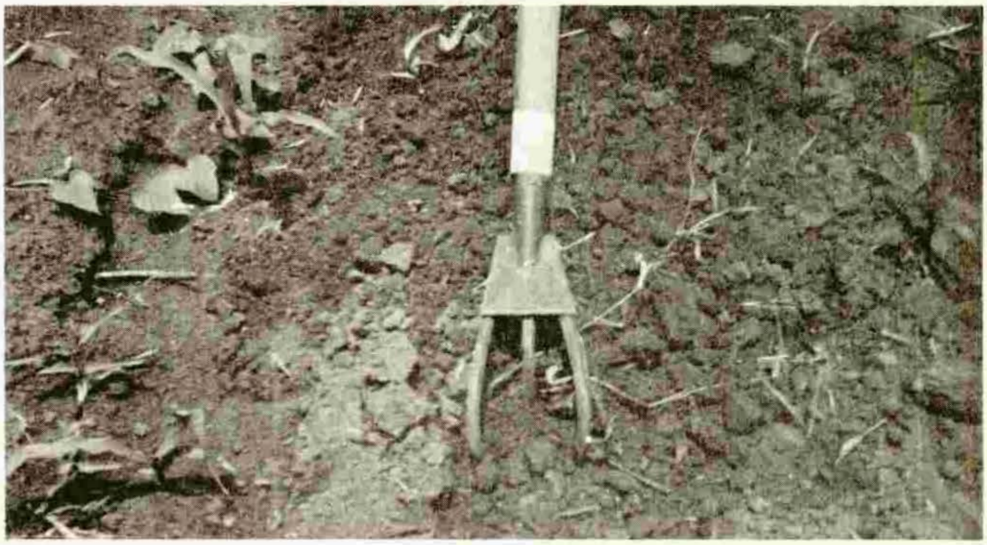
The same approach has been used with the introduction of improved shelling and threshing tools. Farmers are often occupied with processing the first crop when they should be preparing their land for the second crop.

TOOLS AND IMPLEMENTS UNDER EVALUATION

1. Weed Control.

(i) Three Pronged Cultivator.

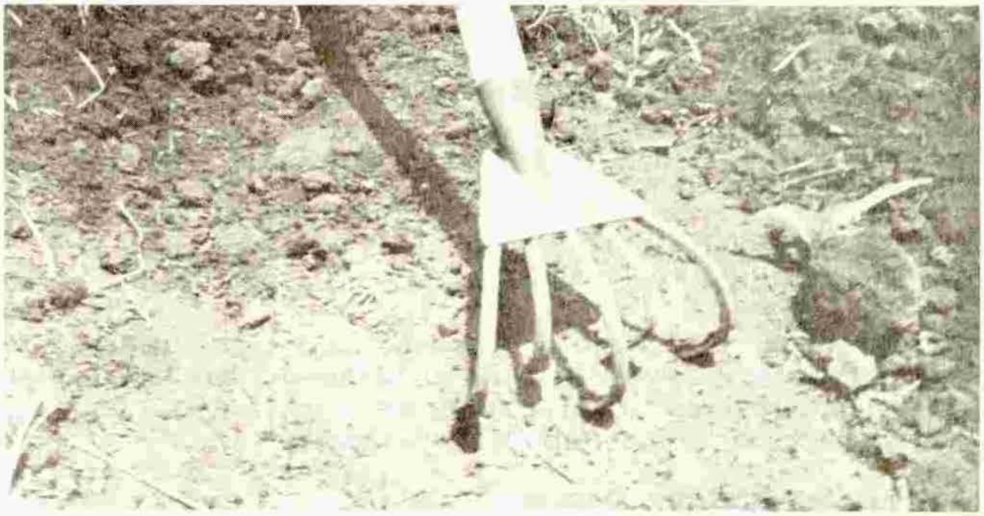
This simple hand tool has been adapted from a garden cultivator commonly used in Australia. The tynes are forged from either 8 millimeter square bar or strips of broken truck spring cut to a similar size. Spring steel is preferred because of its greater durability. The tynes are welded to a trapezoid base plate to which a conical handle attachment is fitted. The effective working width is 10 cm which makes it ideal for weeding upland rice planted on 25 cm row spacing.



Three pronged cultivator

(ii) Five Pronged Cultivator.

This is an enlarged version of the three pronged cultivator. With a working width of 20 cm it is suitable for weeding mungbean, peanut and soybean.



Five pronged cultivator

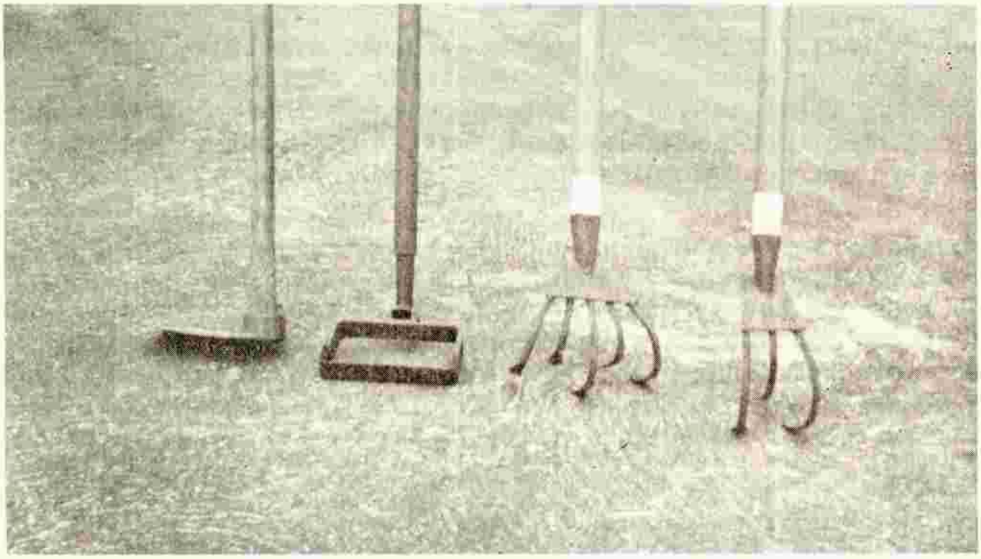
(iii) Push-Pull Hoe.

A flat cutting blade sharpened on both sides is attached to a wooden handle. A pivot arrangement allows 20 degrees of movement. During operation this hoe is pushed and pulled by the operator so that the sharp cutting edges of the blade dig shallow in the soil and cut the weeds.

(iv) Chipping Hoe.

The chipping hoe has a blade 10 cm wide and 17 cm long fashioned from a broken truck spring. A conical head provides strong attachment for the wooden handle. Chipping hoes work on impact. The operator has to lift the hoe and strike the soil with some speed so that the blade digs in and cuts the weeds at the root zone.

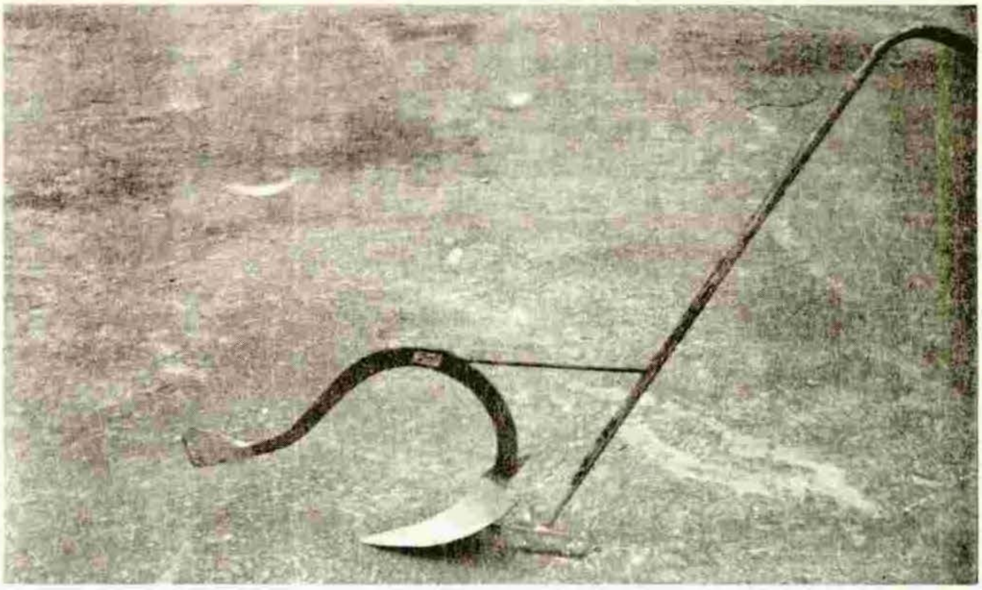
The three and five pronged cultivators and the push pull hoe work well when weeds are small and the soil is not too hard. They do not dig deep into the soil. Under favourable conditions they achieve a faster work rate than the chipping hoe. The chipping hoe is most suitable when the weed population is high, weeds are taller and the soil is hard.



Introduced hand weeding tools. L to R Chipping Hoe, Push-Pull Hoe, Five Pronged Cultivator, Three Pronged Cultivator

(v) The Mini Furrower.

This light implement was originally designed by a small manufacturer in the Province. It has the appearance of a miniature plough but with a double winged furrower, and was introduced as a weeding tool for narrow spaced crops (50-60 cm) and as a furrower for shallow planting. It is easy to pull and has a capacity of 2-4 man/days per hectare.

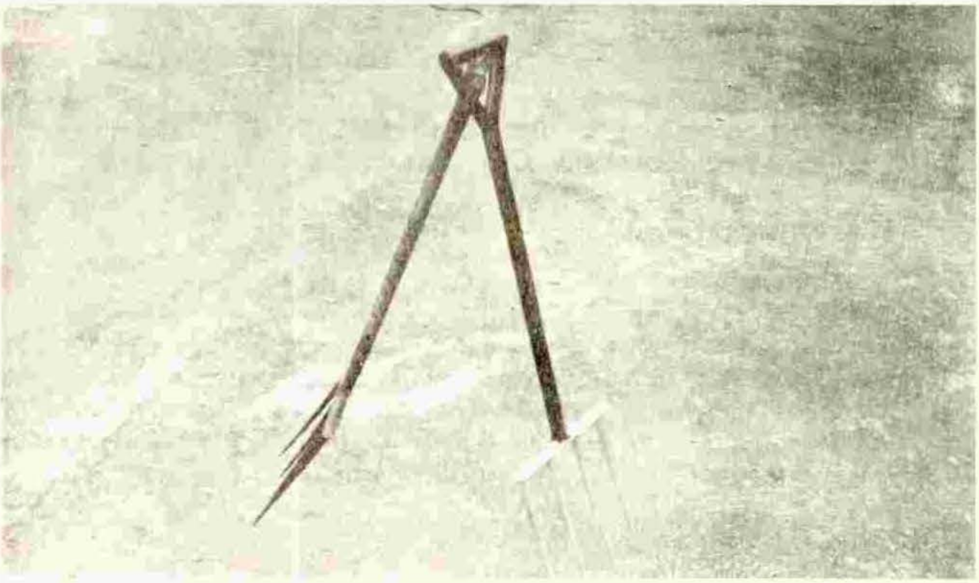


The mini furrower is ideal for weeding the narrow spaced legume crops.

The original furrower has been redesigned and strengthened but failures still occur when the implement strikes obstructions. The cost will increase if the implement is strengthened further. The implement has a big potential but there is doubt that it can be made reliable at an economically attractive price to the farmer.

2. Harvesting.

Peanut pod loss can be high when soils are hard and considerable hand sifting of soil is required to retrieve the pods. The digging or spading fork has recently been introduced for peanut lifting. It enables the soil to be loosened as the plant is pulled thereby reducing peg breakage. Local blacksmiths are making the fork using thin strips of broken truck spring fitted to



The digging or spading fork

handle fashioned from water pipe. A wide curved foot rest has been fitted for bare foot work.

3. Shelling and threshing.

(i) Hand Maize Sheller.

A simple sheller developed at IRRI is being introduced to the farmers of the Province. Four steel teeth revolve inside a tube fitted to a stand mounted solidly. The operator pushes the maize cob against the teeth with one hand while turning the handle with the other.

Hand maize sheller

(ii) Pedal Operated Rice Thresher.

This simple pedal thresher was originally designed by the Institute of Agricultural Engineering and Technology, University of the Philippines, Los Baños, and has been reproduced with some modifications to the drive mechanism.

The pedal thresher has created good farmer interest.

Timber and galvanised sheet are used to form the main frame while steel bar, shafting, small bearings, bicycle sprockets and chain make up the drive mechanism. The threshing drum consists of wooden bars fitted with wire loops.

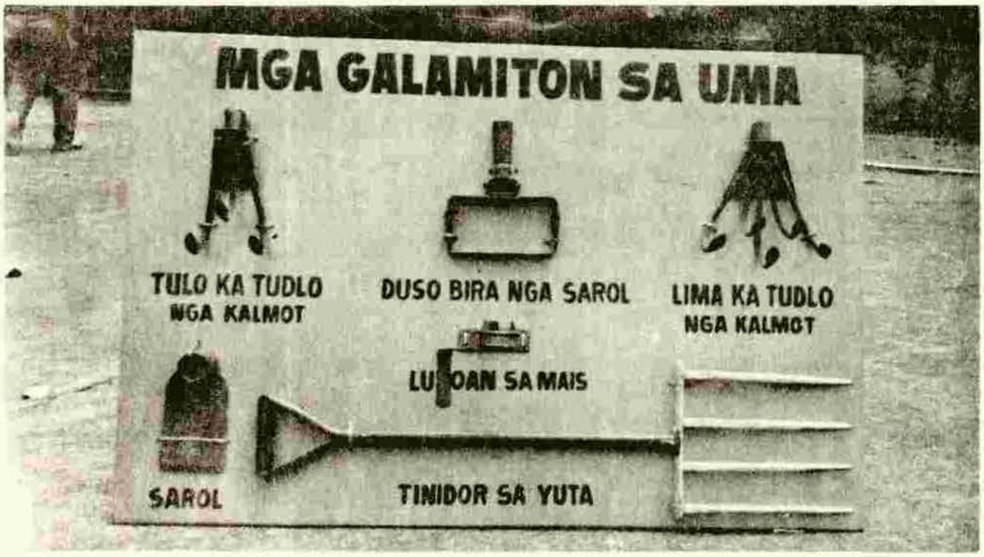
Some farmers in 1983 have achieved a threshing capacity of three cavans (150 kg) of palay rice per hour, while approximately 100 kg appears to be the average for experienced operators. This compares with 800 to 1,000 kg per hour from an IRRI designed mechanical thresher costing between 16,000 and 20,000 Pesos. The approximate commercial cost of the ZDSDP pedal thresher is 1,600 Pesos.

EXTENSION PROGRAMME AND TRAINING

The principal constraint to the adoption of improved practices, tools and implements is the availability of cash. The inability of farmers to purchase seeds, fertilizers, chemicals and labour without credit, has a direct effect on the type of tools and implements developed and subsequent farmer acceptance.

Those farmers who obtain credit via the MCPP can be assisted with the purchase of tools by incorporating the capital cost into the loan. Farmers in the credit programme will tend to be the future innovators and adopters of new technology. Therefore this group is being used for initial dissemination and extension of new tools and implements. The established technician and farmer meeting system provides a ready avenue for information extension.

The future acceptance of improved tools by farmers will depend on their price and local availability. The first step in the programme is to develop local desire and capability to manufacture for farmers. A suitable blacksmith or welding shop is selected and asked to produce a copy of the sample provided. If the finished product is of suitable quality and the proprietor is willing to cooperate he is provided with templates and welding fixtures to produce the tools. Some blacksmiths require assistance to establish supply sources for steel and scrap metal. A display board is also given to each blacksmith showing a sample of each tool he is making.



A display board shows the tools available at the local blacksmith.

With a local supplier of tools established, farmer extension can then begin. Lectures and demonstrations are given at MCPP technician and barangay meetings. Samples of each tool are left with either the barangay captain or MCPP technician for farmer evaluation. Farmers are informed of the nearest local supplier of tools. Several tools are being promoted to allow for farmer preference. As yet there are no definite trends.

Pedal threshers will need to be constructed by machine shops in the larger towns because some specialised engineering is involved. The cost of such items will prohibit individual farmer ownership, therefore it is planned to promote group or barangay ownership.

Local blacksmithing skills are adequate however, further training is required in welding and machining for machine shop owners. The provision of templates and welding fixtures enables cooperating manufacturers to produce items of a uniform standard.

A co-operating blacksmith shaping spring steel for three and five pronged cultivators.

PROBLEMS AND FUTURE DEVELOPMENT

Farmers are showing a high degree of interest in the tools being introduced, however, a cash shortage at weeding time prevents purchase at the critical time. All of the hand tools are being produced at prices ranging from 20 to 50 Pesos, which should be within the capacity of most farmers. Consideration is being given to using a portion of the MCPP loan cash reserve for the farmer to buy tools. The cooperating blacksmiths have not been operating long enough to monitor sales.

Sufficient tools have not been in the field long enough to determine long term acceptability. Ergonomic factors may determine acceptance. Local farmers traditionally squat when working, whereas most of the introduced hand tools are operated in a standing position.

The success of the programme will depend on local availability of tools at a reasonable price. If a self sustaining manufacturing capacity can be established there will be less reliance on infrastructure support from the line agency concerned. As the level of technology in the Province rises, then technical support can be given by the line agency personnel to the various cooperating manufacturers.

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TREE CROPS

John E. Bee - Tree Crops Agronomist

INTRODUCTION

The Tree Crops Project (TCP) was initiated in 1981 for the following reasons:

1. The Province is typhoon free and has large areas of potential tree crops land.

2. A large World Bank/IBRD Commercial Tree Crops Project for Mindanao was proposed for rubber, cacao and coffee.

3. The Ministry of Agriculture (MA) and the Philippine Coconut Authority (PCA) had national programmes underway for the expansion of these crops.

4. The Development Bank of the Philippines (DBP) was expanding its lending programme for these crops in Mindanao.

5. The Philippines was a large importer of cocoa and had potential to be a significant exporter of coffee and rubber.

Studies by T. Hubbard and S. Subramaniam (1979-1980) showed that Mindanao in general and Zamboanga del Sur in particular, had the necessary climate, soils and land for tree crops, particularly cacao, coffee and rubber. However, the Province lacked trained and experienced technicians, smallholder extension services, successful smallholder operations and reliable sources of planting materials.

Successful large commercial operations of these crops were in existence both in Zamboanga del Sur (rubber) and in other parts of Mindanao (cacao, coffee and rubber). The basic technology was therefore readily available in the Philippines. It was expected that the technologies would require modification for successful smallholder operations.

MAWA Hybrids on PCA Pilot Farm

The project was to initiate and promote the development of smallholder cacao, coffee and rubber in Zamboanga del Sur. This was to be carried out in conjunction with the national programmes and the proposed IBRD Commercial Crop Project in Mindanao which was due to start in the early 1980's. The project goal was not to establish an industry but to initiate the necessary support services.

OBJECTIVES

The objectives of the tree crops project are:

A. Planting Material Development - To establish sources of suitable planting material at strategic locations for future expansion of the industry.

B. New Industry Development - To promote and demonstrate modern smallholder technology in growing, processing and marketing of the crops; by establishing "nucleus" demonstration farms and processing units; and

C. Extension, Training and Industry Development - To assist the line agencies and other organisations in providing a smallholder extension service by the development of training centres, training technicians and developing appropriate extension services and facilities.

PROJECT DEVELOPMENT AND OUTCOMES

A. Planting Material Development

Initial studies had shown that much of the planting material used by smallholders in the Province was of questionable parentage, was generally low yielding, and exhibited poor agronomic characteristics.

The major goal of the entire ZDSDP project for Phase II (1981-85) is to provide a self sustaining capacity. Thus the establishment of long term supplies of reliable planting material in many locations for access by as many farmers as possible became a primary target of the TCP. The Project is designed to provide at least one major budwood nursery or seed garden for each crop in each suitable municipality and assist commercial nurseries in their own development to ensure a continued supply of planting material.

The rubber component (TCP.2) is already successfully underway with ten (10) Municipal or Ministry of Agriculture budwood nurseries established. Each has more than 1000 certified budwood trees per nursery using clones RRIM 600 and GT-1. More are planned for 1983-84. The main reason for this quick development is that RRIM 600 and GT-1 have already been proven to be suitable for smallholders. Long term evaluation of other clones is still required but in the meantime these two are considered to be excellent and will cause no major problems. Twelve Malaysian clones were introduced specifically by TCP for the purpose of providing additional long term evaluation by the MA, Universities and other institutions.

The establishment of planting materials for TCP.1 (cacao and coffee) is only just underway due to the time taken to locate suitable material. Unlike rubber, there is no suitable smallholder cacao planting material presently available in the Philippines. An importation, selection and evaluation programme is being promoted at a national level. This will require a well organized programme at major centres by the line agencies and is probably beyond the scope of the ZDSDP project. Nurseries of Robusta and Excelsa coffee have been established at a number of locations.

B. NEW INDUSTRY DEVELOPMENT

In 1981 there were no successful smallholder ventures for use as demonstrations and for farmer training.To fulfill this need demonstration farms had to be established.

Emphasis in 1981 and 1982 was on establishing 85 cacao demonstration farms, each with 500 plants or 0.5 ha., of Upper Amazon Hybrid cacao. Unfortunately in 1981, plantings were seriously infected with Vascular Streak Dieback (VSD) and this virtually annihilated the industry. Lines more resistant to VSD and more suitable to smallholders now have to be introduced and evaluated.

For coffee, more than thirty Robusta demonstration farms were planted in 1983.

C. EXTENSION, TRAINING AND INDUSTRY DEVELOPMENT

This objective has three targets: -

1. Developing training centres.
2. Training technicians and farmers.
3. Provision of extension aids and equipment.

1. Training Centre Development

The objective was to establish training centres at central locations with easy access to technicians, farmers and other relevant persons. For cacao/ coffee this meant major centres in the main cropping areas such as Aurora and the Baganian Peninsula. These centres could be used for clonal evaluation, trial work and training centres and needed to be between 5-10 ha. There are other centres in Mindanao, at Zamboanga City and Davao but they are too far away and unsuitable for this Province.

For rubber, two obvious centres are in the western part of the Province where considerable areas of rubber are already established and the northern region around Dumingag/Dapiwak where the greatest area for expansion exists. Both these areas are being developed; at Ipil in the Western end by the MA and by the Zamboanga del Sur National Agricultural School at Dapiwak.

2. Training Technicians and Farmers

In 1981, the MA appointed one TCP.1 supervisor and one TCP.2 supervisor to serve as counterpart to the resident tree crop specialist and supervise the line agency technicians and operations.

More than twenty MA technicians have been assigned full time to the ZDSDP since 1981. Seven of these undertook a two week smallholder rubber course at the Rubber Research Centre, Hadyai, Thailand. The remaining technicians have undergone concentrated local training by the tree crop specialist and the crop supervisors. They have now been assigned to different municipalities in the Province.The PCA have twenty coconut development officers who have been trained in smallholder cacao and coffee.

The main activity during 1981 was the training of line agency technicians in programme development. In 1981 and 1982 several hundred training courses were conducted for farmers, students and other interested persons in all aspects of tree crops.

3. Provision of Extension Aids and Equipment

Up to 1981 there was a very limited extension service provided by the MA for rubber and cacao/coffee and a similarly limited one from the PCA on cacao/coffee. There were very few suitable or available publications, pamphlets and extension aids.

Since 1981 approximately fifty extension publications on these crops have been produced by the ZDSDP as well as extension aids such as photographs and slide collections. The publications are released to all interested persons including farmers, technicians, students, lending institutions and libraries.

ADDITIONAL OUTCOMES

The concept of the "nucleus" demonstration farms was introduced to maximise the Training and Visit System of extension. One or more of these demonstration farms are established and supervised by each assigned tree crops technician (one per municipality) and he uses that "nucleus" demo farm as the training centre for key farmers for each barangay. The demonstration farm is placed in such a location to allow both that farm and nearby farms to further expand into the crop and thus create a situation favourable to group training, group processing and group marketing. These demonstration farms (0.5 ha for TCP.1 and 1 ha. for TCP.2) are not intended as economic areas but as a "nucleus" upon which to expand. Only fencing and establishment inputs are provided free of charge.

There is little information on selection criteria for tree crop demonstration farms, the guidelines used in this project could be of interest to other workers. These are:

CRITERIA FOR SITING A DEMONSTRATION FARM

A suitable demonstration farm should: -

1. Be on a major road or track so that it is seen by a large number of persons who could benefit; or at a prominent location such as near a major meeting site e.g. church, cemetery or market,

2. Be easily seen from the road when using the most common form of transportation.

3. Be in an area contiguous with other areas suitable for that crop.

4. Be within close proximity to the office or the home of the supervising technician to allow regular supervision.

5. Be easily accessible to vehicles for supply of inputs and field trips or inspections.

6. Have additional area for

    a) further expansion of that crop into an economic unit if necessary and for

    b) supply of additional income if necessary for maintenance of demonstration farms.

7. Have soil type and topography which is representative of the surrounding areas and lies within the general recommendations for that crop.

NOTE: Free inputs such as fencing, planting material and establishment chemicals for the first season only are provided in stages. Only when the first stage is completed is the next set of inputs provided e.g. fencing when clearing is complete and plants when fencing and holing are completed.

CRITERIA FOR FARMER SELECTION

A suitable farmer co-operator should:

1. Be a well proven farmer and preferably a former cooperator.

2. Be reasonably representative of surrounding farmers regarding income and farm size.

3. Be a well-accepted farmer within the community.

4. Have an alternative and adequate income to allow him to maintain the demonstration farm until it comes into production.

5. Be willing to follow the directions and recommendations of the supervising technician and be willing to allow his farm to be used as a teaching/training center for other farmers and technicians.

DISCUSSIONS, PROBLEMS AND THE FUTURE

The tree crops project of ZDSDP is facing a somewhat bleak future.

At present there is excellent commitment and follow through by the line agencies and the TCP.1 and 2 supervisors and technicians. Unfortunately there are insufficient funds available from the line agencies to support the Australian input. Furthermore the proposed Commercial Tree Crops Project (World Bank) has lapsed and the line agencies national programmes are not yet underway.

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CACAO

John E. Bee - Tree Crops Agronomist

INTRODUCTION

Cacao (cocoa) has been grown in the Philippines for approximately four centuries but only in the past 10 years has there been any major successful planting. The Philippines is presently an importer of cocoa for up to 90-95% of its requirements and is likely to remain a major importer for many years to come. Consequently there is a good reason for the government's and Zamboanga del Sur Development Project's (ZDSDP) interest in expanding cacao.

The Philippines has large areas of coconuts but a large proportion of the underpalm space is lying idle. This environment is excellent for cacao (and also coffee) and growing cacao under coconuts has been proven to be highly beneficial to the production of coconuts themselves. So, with very little effort and with no loss of productive land it is possible to greatly expand smallholder cacao.

Since the late 1970's there has been a national programme of interplanting coconuts with cacao, coffee and other crops such as pineapples and papayas. Initially this was under the auspices of the Philippine Coconut Authority (PCA) but more recently the Ministry of Agriculture (MA) has become involved. This programme in 1983 was allocated ₱25,000,000 for the production, release and planting of cacao and coffee seedlings for interplanting coconuts. Much of this is supposed to be for Mindanao, due to its freedom from typhoons and its' large areas of coconuts.

The cacao/coffee tree crop programme (TCP.1) was designed to include these two line agencies, the PCA intercropping with coconuts and the MA promoting monocrop under giant ipil-ipil (Leucaena spp.), madre de cacao (Gliricidia spp.) or banana/fruit trees. The most recent MA expansion programme also involves intercropping under coconuts. The entire ZDSDP tree crops programme is based on smallholder production involving areas from as small as a couple of trees in the backyard up to several hectares. It was not proposed to enter into any financing/credit scheme unless specifically requested.

Breaking cocoa pods

OBJECTIVES

The broad objectives for cacao are:

A. Planting Material Development

Collection or introduction, multiplication and release of planting materials for smallholders and the establishment of seed and budwood gardens for future supplies. Selected F1 Upper Amazon Hybrid cacao seeds were imported from Malaysia and planted in seed gardens under the supervision of the MA and PCA ZDSDP group.

B. New Industry Development

New industry development involves the establishment and demonstration of modern smallholder methods of propagation, crop culture, processing and marketing. This revolves around the establishment of nucleus demonstration farms and nurseries using the farmer as the "key contact farmer" in the Training and Visit system of extension.

C. Extension, Training and Industry Development

Assisting the line agencies and other organizations in establishing a smallholder extension service. This involves developing training centres, the training of technicians and providing extension services and facilities.

HISTORICAL DEVELOPMENT AND OUTCOMES

General

In the late 1970's Davao Fruit Corporation (DFC) was the largest cacao producer in the Philippines. The type of cacao they initially planted was selected Trinitario with some Amelonado. However, as soon as Upper Amazon Hybrids became available they changed over by budding or replanting. Not long after this, another large corporation, Cocoa Investors Incorporated (CII) also began planting Upper Amazon Hybrids. These two plantations, the two largest in the Philippines, are still using Upper Amazon Hybrid and intend to continue to do so. Recent plantings by other organisations are also using the same basic planting material.

Upper Amazon Hybrid cacao was selected as the type to plant for the smallholder programme. The reasons for its selection were well founded and seemed at that time completely justified and practical. They were:

(1) It was already planted by large plantations in Mindanao and performing well, producing high yields with uniform beans of acceptable size and quality.

(2) It starts cropping early (less than 2 years) and comes into heavy production by its third year of bearing.

(3) It shows more tolerance to cocoa pod borer (Acrocepods) than do local Trinitario lines - (called Brazillas).

The initial project proposed for TCP.1 involved upgrading existing farms and using them as training centres. However, due to the scarcity of such farms and the enthusiasm of the PCA to immediately initiate plantings of cacao under coconuts, the planting programme went into full production very quickly.

In 1981, in coordination with PCA and MA, ZDSDP TCP.1 planted or supervised the planting of more than twenty lines of imported F1 Upper Amazon Hybrid (about 15,000 plants). These were basically the same parent lines as are presently being grown by DFC and CII. ZDSDP also supplied about 80,000 F2 Upper Amazon Hybrid seedlings for planting on smallholder farms. More than fifty farms each of 0.5 ha. were planted as nucleus demonstration farms and all of the establishment inputs were provided by ZDSDP. The F2 seeds came from F1 parent lines of DFC.

In 1982 ZDSDP dispersed approximately 180,000 seeds of F2 Upper Amazon Hybrid from DFC to smallholders and planted approximately one hundred new nucleus demonstration farms. Thus, for both 1981 and 1982, ZDSDP with the PCA and MA were instrumental in planting in excess of 250,000 F2 Upper Amazon Hybrid seedlings in this Province. Approximately one hundred demonstration farms were established under coconuts by the PCA (including 40 PCA credit scheme farmers) and approximately fifty were established by the MA under ipil-ipil, bananas and fruit trees.

Hi/Lo Technology

Upper Amazon Hybrid cacao was introduced by ZDSDP for its high yield and bean quality factors. However, it is now realised that it is a high technology type of cacao requiring reasonably heavy rates of fertilizing and constant attention in the form of pruning, pest control, weed control and irrigation. It has been found that smallholders cannot or will not provide the necessary attention.

Experience with smallholder growers and technicians has indicated that they have difficulty accepting the necessity for pruning cacao to manageable jorquette height and for Vascular Streak Dieback (VSD) control and the need for regular spraying for insects. This attitude is changing at a slower rate than desirable and in many cases these practices may never be accepted.

Removing a low jorquette

Cocoa at correct bearing height

In contrast the locally selected Trinitario type is a low technology cacao. Unfortunately its bean size and uniformity leaves much to be desired. It is satisfactory for local/barangay consumption and for manufacture into cocoa tablets but it is not suitable for sale to processors. It is also very susceptible to cocoa pod borer (acrocepods) although this is presently being overcome by smallholders covering the pods with cellophane sleeves once they reach about 7-8 cm in length. For smallholders the obvious choice is to plant selected Trinitario with good bean characteristics and VSD resistance. However, at the moment resistance is not readily available.

VSD Problem

In the late 1970's and early 1980's occasional occurrences of VSD (*Oncobasidium theobromae*) were reported in Zamboanga del Sur (Hubbard pers comm). No severe outbreaks were observed and the occurrence was said to be of no serious consequence at that stage. Prior to this there had been no official record of the disease occurring in the Philippines.

In 1982 a serious outbreak of VSD was reported within the Province (Bourke pers comm.). The exact reason for this sudden outbreak is unknown but contributing factors could be an unusually long and intense wet season in 1982 and more than 250,000 susceptible young actively growing seedlings. The combination of free water plus young leaf tissue provided the required infection conditions.

Regular monitoring by ZDSDP trained personnel in late 1982 showed that about 80% of all farms were infected by VSD. The infection rate per farm was extremely variable, ranging from 0-80% with the most common occurrences between 35-50%. Only one farm had 0% infection and this was situated on an island.

As VSD is terminal and the symptoms take 2-4 months to appear, it is estimated that at least 20% of all young cacao in this Province are now dead from VSD. The severe dry of 82/83 caused many additional cacao plants to die before the start of the wet season in June 1983.

Stem borer also contributed to some of the tree deaths. Most farmers now have heavy tree losses from the 1981 and 1982 plantings. They have blamed the dry and not VSD for the deaths.

The situation with the large plantations such as DFC is that the disease incidence is low due to a concerted and effective pruning programme. It is expected to remain a constant but manageable problem.

ZDSDP Attitude to Cacao

In late 1982 and early 1983 ZDSDP staff spent considerable time and effort in alerting the MA and BPI (Bureau of Plant Industry) to the existence of VSD and its potential to be the number one problem for smallholder cacao. The existence and potential danger of VSD are now recognized. Regettably, commitment to the national programme and the seed purchase agreement with CII means that there is still a large programme of expansion of the smallholder cacao industry using F1 Upper Amazon seeds.

The present varieties and cultural practices used by the larger plantations appear to be satisfactory. However, quite the opposite could be said for the smallholder situation where the variety of cacao is inappropriate.

ZDSDP has now adopted a different attitude for smallholder planting. It has proposed that no further increase in smallholder planting areas be encouraged until suitable planting material is available.

Because ZDSDP feels a "moral obligation" towards the many demonstration farmers who planted cacao in good faith, it has adopted a restricted replanting programme of selected 1981 and 1982 demonstration farms but without further expansion. This replanting is on those farms where the farmer has shown the ability to be able to live with the VSD problem by proper pruning and is willing to follow other recommendations of the supervising technician. Only about 60% of the original 1981/82 demonstration farms fall into this category.

The planting material used now is from selected Trinitarios with large beans from DFC plantations where they have reported a "tolerance" to VSD. By no means is this the solution to the VSD problem. It is not known how these will stand up to the expected infection pressure when planted into an already infected field. ZDSDP is not over-optimistic but if nothing else, it may show whether or not trained smallholders are capable of living with the VSD problem.

The Solution to VSD

The solution to the VSD dilemma is not simple. At present it appears that local selections of Trinitario are showing more tolerance than the Upper Amazon Hybrid. In Zamboanga del Sur the "reported" VSD resistant F1 Amazons from Malaysia are showing no tolerance whatsoever to VSD and Amelonados grown at DFC showed complete susceptibility to VSD. Upper Amazon Hybrid at DFC showed some susceptibility but at an acceptable level, and the locally selected Trinitario showed considerable tolerance but not resistance. However, the agronomic and bean quality factors of Trinitario still make it grossly inferior to the Upper Amazon Hybrid for larger plantations who will continue to use that variety unless the VSD situation gets out of control.

In the 1960's VSD annihilated the Papua New Guinea (PNG) cocoa industry and the very few surviving plants formed the base for the present VSD resistant planting material. This material was originally Trinitario but there are now selected Trinitario x Upper Amazon crosses. There are therefore two possible solutions for the Philippines VSD situation, namely:

(i) Select from within the surviving Upper Amazon Hybrids and local Trinitario for VSD resistance and suitable agronomic characters.

(ii) Import directly from PNG and select and evaluate for local suitability.

Some observers feel that VSD symptoms occurring on smallholder farms in this Province appear more severe than those occurring at DFC and in Malaysia. It is thus possible that a more virulent strain of Oncobasidium has developed but this is unconfirmed.

Furthermore, the pattern of spread indicates the occurrence of an unknown alternative host(s). Farms in areas completely isolated from other cacao have become heavily infected. This concurs with the observations of Keane (1981). However, Keane also reports that Oncobasidium theobromae has never been found on any plant other than cacao.

PROSPECTS FOR SMALLHOLDER CACAO IN THE PHILIPPINES

The market prospects for cacao in general are excellent. However, the future for "smallholder" cacao is not promising while the VSD threat continues.

Other countries are major smallholder producers of cocoa. The Philippines requires a well organized, honest approach to the situation and a national commitment to a smallholder industry. Without this, the bulk of cocoa produced in the Philippines is likely to come from large plantations such as DFC, CII, Matling, Menzi and others.

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COFFEE

John E. Bee - Tree Crops Agronomist

INTRODUCTION

The Philippines is an exporter of coffee and a member of the International Coffee Organisation (ICO) which implements the International Coffee Agreement (ICA). In 1983, the ICO agreed on production restrictions in all its member countries. The Ministry of Agriculture announced in January 1983 that the Philippines had to reduce its present production by 36,000 tonnes.

This planned reduction was because the Philippines is already a significant producer of coffee. Therefore there should not be any major expansion programme.

Almost all of the coffee production in the Philippines is robusta, with some excelsa and very small amounts of arabica.

OBJECTIVES

Coffee and cacao each form half of the Zamboanga del Sur Development Project (ZDSDP) TCP.1 Project. Both of these crops have similar cultural requirements regarding shading and management but coffee is somewhat easier to grow and more suited to "low technology" farming.

The broad objective of the programme is to assist the line agencies in promoting and establishing a modern smallholder coffee industry in Zamboanga del Sur (ZdS). It has the same specific targets as the other components of the tree crops programme namely:

A. Planting Material Development - Collection and introduction of clonal material for multiplication and release to smallholders, as planting material; and establishment of seed gardens for the continuous supply of these clones.

B. New Industry Development - To demonstrate and promote modern smallholder methods of propagating, growing, processing and marketing coffee by using demonstration farms.

C. Extension, Training and Industry Development - Assisting the line agencies and other organisations to establish a smallholder extension service, by training technicians and farmers and developing training centres.

HISTORICAL DEVELOPMENT AND OUTCOMES

The Philippines produces considerable quantities of robusta coffee. Most of the producing areas are at low altitudes which are generally unsuitable for arabica. There is significant production of the local, poor quality excelsa but it commands a lower price and is often difficult to sell. It's main use is in coffee blends.

Coffee is produced throughout the Philippines with the main areas being Mountain Province, Cavite and Batangas in Luzon, the Visayas and Mindanao. The scale of production varies from a few backyard trees under coconuts to large plantations. Smallholder production appears to be concentrated in Cavite and Batangas while the plantation areas are around Bukidnon in Mindanao.

The coffee project started because there were existing national smallholder expansion programmes within the Ministry of Agriculture (MA) and the Philippine Coconut Authority (PCA), together with the additional thrust of farmers' self sufficiency programmes. These programmes have been widely publicised and considerable funds have been released to the MA.

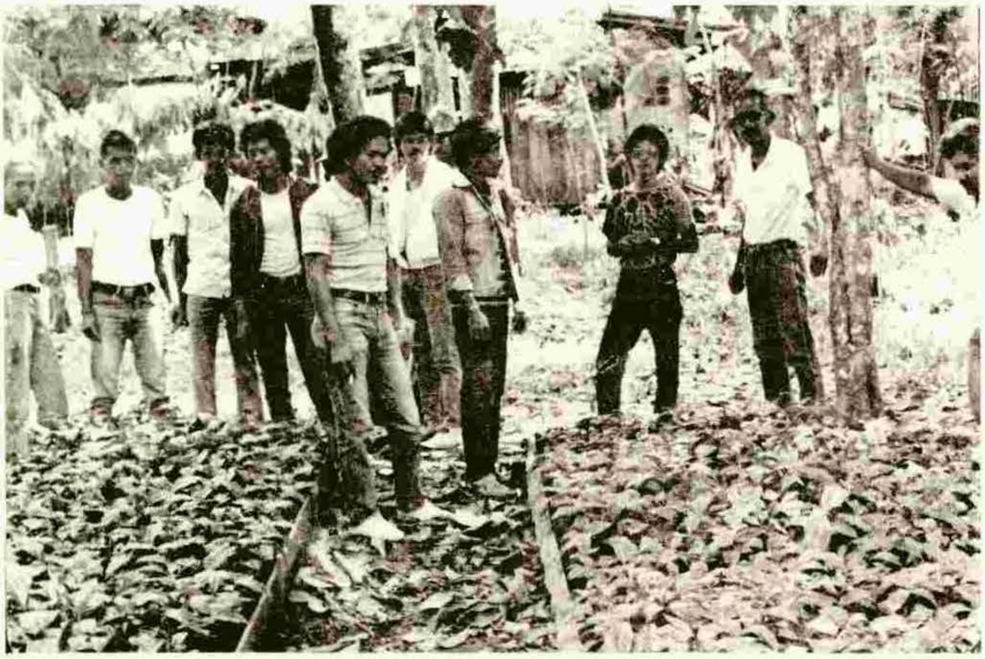
The ZDSDP coffee project commenced in 1982 with the planting of selected robusta seeds from a large commercial planting in Bukidnon. The resultant seedlings were all planted on smallholder demonstration farms in mid 1983 under the supervision of the line agencies.

To date approximately forty demonstration farms have been planted each with about five hundred seedlings. Approximately half were planted by the MA and half by the PCA. About 80% were robusta and 20% excelsa.

PROBLEMS AND PROSPECTS

There are few cultural problems for smallholders growing this crop. Robusta is recommended due to its better quality and ease of production. Excelsa is only recommended on a very small scale for home consumption. Coffee production by smallholders is considerably less risky than cacao.

There appears to be excellent potential for local production and local sale of coffee but for larger scale production there could be serious ramifications, particularly if the ICA proposal is to be honoured. However, there is still a national line agency programme for expanding smallholder production of coffee, particularly as an intercrop with coconuts.



Coffee seedlings at private nursery

RUBBER

John E. Bee - Tree Crops Agronomist

INTRODUCTION

Rubber is well suited to many parts of Zamboanga del Sur, particularly the inland areas presently dominated by Imperata cylindrica (cogon or lalang).

Production capacity has been proven within Zamboanga del Sur and many parts of Mindanao over the past thirty years, with production equal to or better than Thailand's or Malaysia's. Technology of rubber production is well advanced and well accepted in Mindanao but only in the plantation situation. Modern smallholder rubber production technology, whilst practiced to a very limited degree in some areas, is not widespread. The smallholder rubber producer trails behind his counterparts in Malaysia and Thailand.

OBJECTIVES

The broad objective of the rubber component of tree crops is the same as for cacao and coffee namely; to assist the line agencies in promoting and establishing a modern smallholder rubber industry in Zamboanga del Sur (ZdS).

It also has similar specific targets or objectives namely:

A. Planting Material Development - by the importation and establishment of rubber budwood gardens in strategic locations for the long term supply of selected budwood or approved clones.

B. New Industry Development - To demonstrate and promote modern smallholder technology of rubber production by the establishment of nucleus demonstration farms and nurseries.

C. Extension Training and Industry Development - assisting the line agencies and other organizations in establishing a smallholder extension service and the training of technicians and farmers.

HISTORICAL DEVELOPMENT AND OUTCOMES

The stimulus for the development of the rubber project was the proposed IBRD/World Bank Loan for a smallholder rubber development programme in Mindanao which was due to commence in 1980/81. The Ministry of Agriculture was keen to promote the development of a smallholder industry in ZdS.

The application of modern rubber technology is almost entirely restricted to plantation type management such as in the successful establishment of commercial rubber plantations by Goodyear and others in Zamboanga del Sur. Modern smallholder technology is only available in scattered localities.

The project aimed to overcome this deficiency starting with the shortage of reliable recommended planting material and progressing through growing, to sheet making and organised marketing.

Outcomes to date are:

1. The importation of 12 Malaysian rubber clones for distribution and for long term suitability trials and evaluation.

2. The establishment of more than 10,000 certified budwood trees of the well proven clones RRIM 600 and GT-1 in ten strategic locations throughout the Province with a predicted yearly output in 1984 of enough budwood to plant well in excess of 1,000 hectares per year.

3. The establishment and operation of ten seedling nurseries with an estimated 1983/84 output of more than 150,000 budded seedlings for use by smallholders.

4. The establishment of 17 nucleus demonstration farms each with 1 hectare of rubber.

5. The training of twenty Ministry of Agriculture tree crop technicians in all aspects of modern smallholder rubber production including a two week study trip for the seven senior technicians in 1982 to the Rubber Research Centre in Hadyai, Thailand.

6. The production and release to technicians and farmers of more than twenty publications on modern smallholder rubber production.

PROBLEMS AND PROSPECTS

Despite excellent progress the present smallholder rubber project of ZDSDP has foundered. The project can no longer justify the employment of a full time tree crops specialist consultant. The major reasons for this are:

1. Present inactivity of the IBRD/World Bank Loan, with little possiblity of its commencement in the near future.

2. The failure of the Development Bank of the Philippines (DBP) to promote and expand rubber development programmes.

3. The unavailability of MA funds to support Australian Government funding of inputs.

The prospects for a smallholder rubber development programme in Zamboanga del Sur are excellent if these constraints are removed.

A large development programme involving a major successful financing/lending authority with a settlement and coordinated training programme could ensure a successful venture.

To develop and maintain present nurseries and demonstration farms in a condition to ensure future productivity and success will require funding of inputs for the next two years. The training of technicians and farmers would also require funding for this time. Therefore, Australian funding will be continued.

Tapping rubber

Making rubber sheet

LIVESTOCK PROGRAMME

David K. Hitchcock - Livestock and Extension Specialist

Livestock are an integral part of the farming system on small farms in Zamboanga del Sur (ZdS). They provide food, fuel, fertilizer, cash income and work animals for draught and transportation.

The fundamental aim of the agricultural component of the Zamboanga del Sur Development Project (ZDSDP) was to increase production and profitability of large numbers of small upland farms (ZDSDP, 1978). A survey of livestock ownership and production was conducted by Synnot in 1978 to provide baseline data which could be used to design appropriate research and extension programmes.

The survey revealed that most farms in ZdS were quite small; (56% below 1.5 ha, 80% below 2.5 ha. and only 1% above 10 ha). Cropping was found to be the major activity and source of income, with livestock production as an integrated but secondary income producer. It was concluded that farmers could not afford to devote large proportions of their time to livestock production.

The survey indicated a poultry population of 1.98 million, a pig population of 400,000 and a total ruminant population of more than 300,000 of which 60,000 were goats. More than 60% of households owned more than seven fowls and only 19% did not keep poultry. 58% of households raised pigs while only 8% kept cattle and less than 50% kept a carabao for draught purposes.

The question of what is the most useful and appropriate species of livestock to promote in developing countries is a matter of great controversy. Early livestock promotion in the Philippines concentrated on pigs and poultry. At the time of planning the ZDSDP agricultural projects the Philippines Council for Agriculture and Resources Research and Development (PCARRD 1977) was giving higher priority to ruminants than to non-ruminants. At the same time the future research programme of the Bureau of Animal Industries (BAI) for Region IX was stressing goats and they intended to establish a livestock breeding station in ZdS (BAI 1978). They nominated this as the project of highest priority for Australian assistance.

In Phase I the project thus concentrated on cattle for draught and goats for meat and milk. The results from the livestock survey conducted by Synnot (1978) and a further farm survey by Denning (1980) influenced the proposed livestock programme with respect to increasing draught animal numbers at the barangay level.

In 1979 when the Australian Development Assistance Bureau and the Government of the Philippines reviewed Phase I of the project and designed a five year plan for Phase 2 from 1981 - 1985, two guidelines for livestock projects were emphasised. These were:

1. The target audience for livestock projects should be small farm owners and tenant farmers rather than large farmers and businessmen.

2. The Livestock and Poultry Services Division of the Ministry of Agriculture should be encouraged to develop its capacity and capability so that it can successfully carry on the project after Australian withdrawal ZDSDP 1980).

Two distinct projects have evolved during Phase II (1981-1985).

(i) Ruminant - LDP.1

(ii) Monogastric - LDP.2

(i) Ruminants - LDP.1

The Ruminant Projects presently being conducted and their aims are as follows:

1. Bull loan and cow dispersal scheme: To breed Brahman type animals for loan to small farmers, thus providing a larger animal for draught purposes.

2. Buck Loan Scheme: To help overcome the problem of inbreeding in the Province by introducing new breeds of goats to upgrade local breeds.

3. Barangay Pasture Scheme: To establish small areas of pasture on under utilised land on small holdings, in order to supply feed during the dry months.

4. Goat Demonstration farms: To incorporate the use of a new breed and improved pasture and to transfer the relevant technology to the small farmer.

These projects have been implemented in almost every municipality of the Province. The direction and implementation of these projects is the responsibility of the Ruminant Livestock Team which consists of six Filipino Technicians.

Their duties include supervision and advice to farmer cooperators, organisation and planning of extension activities, liaison and training of other Livestock technicians, collection and analysis of records, and preparation of extension material, reports and project proposals.

Chapters 22, 23 and 24 will describe the Pastures, Cattle and Goat projects in more detail.

(ii) Monogastric Project - LDP.2

Up to 1981 emphasis in the Livestock programme had been placed largely on goats and cattle because these animals do not compete with humans for scarce food resources as do pigs and poultry.

However, with the increase in grain production being generated by the Multiple Cropping Production Programme (MCPP) it was decided to place more emphasis on the breeding and feeding of these small animals, and to investigate the feasibility of setting up a feedmill in the Province to utilize these grains.

Since the most widely owned animals in the small farmer target group were poultry and pigs a major new project for servicing the breeding and management of native poultry and pigs was instigated.

The Monogastric Project commenced in July 1981 and has the following sub-projects and aims:

1. Native Poultry Upgrading and Management Programme. To improve the present low productivity of native hens and to contribute to nutrition of the farm family.

2. Upgrading and improving the management of Backyard pigs. To promote upgrading schemes with native pigs, better utilization of commonly available feeds and improved fattening methods.

3. Upland duck management. To investigate suitable management systems for keeping Muscovy ducks on upland farms.

4. Feedmill Feasibility Study. To investigate the feasibility of setting up a feedmill in the Province and its implementation.

5. Small Scale Layer and Broiler Production. To stimulate the increased production of poultry products by developing small poultry units.

6. Other monogastric animals. To investigate the suitability of small farmers raising other monogastric animals such as quails and rabbits.

7. Backyard Home Vegetable Gardens. To encourage more Filipino families to grow a small plot of vegetables in their backyard for year round nutritional benefits.

To satisfy the second review guideline, referred to earlier, a separate group of Livestock Technicians were recruited to form a Monogastric team. The team of 10 consists mainly of recent graduates and each member of the team is responsible for one major aspect of the programme.

The group is divided into two sections; Extension and Breeding Centre Supervision. On the job training is supplemented with work experience on farms in other Provinces and attendance at specialized courses.

Chapters 25, 26, 27 and 28 will describe the Poultry, Pigs, Duck and Feedmill projects. The quail and rabbit projects exist still as exploratory ones, however, much emphasis is now being given to Backyard Home Vegetable Gardens. A Visayan Technoguide has been written and issued to Livestock Officers and Home Management Technicians and a number of demonstration gardens have been established. It is hoped that this project will have more impact in the remainder of Phase 2.

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PASTURE DEVELOPMENT PROGRAMME

Fabian C. Sweeney - Pasture Agronomist

INTRODUCTION

In 1975 the Ministry of Agriculture (MA) through the Bureau of Animal Industry requested an animal breeding station in Zamboanga del Sur (ZdS). Bagalupa Stock Farm was selected in 1976 to be the site for this breeding station.

To establish an animal breeding station feed must be grown first. In the Philippines and elsewhere there have been cases of high mortality in recently introduced animals due to lack of feed, and too small an area of available pasture.

Pasture development or improvement is a new concept in the Southern Philippines. The local language, Visayan, has only one word sagbot for weeds, grass, legumes and browse shrubs. This general term does not allow for easy translation of imported pasture and legume technology. Nor was there any concept of the relatively new technology of tropical legume and grass pasture mixtures.

OBJECTIVES

The objectives of the pasture programme are to:

(1) Introduce exotic grass and legume pasture and browse species and select from amongst them and the best of the numerous legume introductions to the Southern Philippines since the 1960's, to provide a good ruminant feed source throughout the year particularly during the dry season (February to April).

(2) Demonstrate the establishment, survival and maintenance of suitable, improved, forage species and mixtures to MA technicians and through them to farmers throughout ZdS.

(3) Show and give practical experience to technicians in establishing, using and managing tropical pasture mixtures, fodder crops and browse legumes for cattle, goats, carabao and horses so that they can demonstrate and extend appropriate and profitable technology packages (a) to farmers in ZdS
(b) and to visiting technicians from other parts of the Philippines.

(4) Provide selected forage species for multiplication and animal feed at many sites throughout the Province.

BACKGROUND

Initially most of Southwest Mindanao was covered in rain forest so that there was no native pasture.

The pantropical grass cogon (Imperata cylindrica), known elsewhere as blady, lang lang or kunai, filled the ecological vacuum caused by the logging, clearing and burning of this original rain forest. Much of the rain forest clearing occurred in the last half of this century when population pressure and misuse of local land resources in the Visayas caused large numbers of people to immigrate to this undeveloped humid equatorial region.

The Land Resources Evaluation Survey (LRES) (ANON. 1983) estimated that 30% of the Province (220,000 hectares) was dominated by cogon grassland covering the steeper and poorer fertility landscapes. The main soil types are andesite or metamorphically derived clays of low phosphate status. Large areas of cogon were grazed by cattle until the ranchers were driven out just prior to martial law in 1972, by squatter population pressure, rebel action and the biological invasion by the poisonous weed hagonoy (Chromolaena odorata).

Hagonoy is a major weed of pasture and cultivation. It was introduced in the late 1960's from Central America via South Asia and quickly dominated grazed cogon pastures. Control of this weed using amine 2-4-D has proved expensive but effective and further investigation into biological control is in progress (Sweeney 1980).

Cogon re-growth after burning or slashing is palatable and provides a reasonable but low productivity diet for cattle. Older material is a major source of thatching for roofs.

Four (4) other types of grazed local pastures occur in the Province.

1. The intensively cropped agricultural upland covers 180,000 hectares of fertile soils. Much of this reverts to local pastures, or weeds of cultivation consisting of lacatan (Axonopis affinis), wild Bermuda (Cynodon spp.) and calopo (Calopogonium mucunoides), towards the end of the wet season after the second crop has been planted (October). The cropped agricultural upland provides sparse grazing during the dry season fallow but these edible weed species die off rapidly in February.

2. The major areas suitable for immediate pasture development are under coconuts and consist of 140,000 hectares containing more fertile soils since they were the areas first settled. More than one third of this area (approximately 50,000 ha.) is suitable for permanent improved pasture and has a potential turn-off of 50,000 head of yearling cattle or 500,000 goats per year. Pastures now consist of a heavily grazed sward of the following species:

Visayan Name	Botanical Name	Australian Name
Calopo	Calopogonium mucunoides	Calopo
Lacatan	Axonopus compressus	Carpet grass
Amorsico	Chrysopogon aciculatis	seedy grass
Wild Bermuda	Cynodon spp.	native couch
Bila bila	Elusine indica	crows foot
Carabao grass	Paspalum conjugatum	sour grass
Pandan	Cyperus rotundus	nut grass
Hagonoy	Chromolaena odorata	mist weed
Moni moni	Crotalaria gambiiensis	rattle pod
Moni Moni	Desmodium spp.	unnamed legume
Yoya Yoya	Alternathera spp.	square weed
Limbagat	Stachy taphetum jamaicensis	rats tail
Kanding kanding	Salvia spp.	mint weed
Sagbot	Sida spp.	sida retusa
Burgensusa	Mimosa pudica	small sensitive
Sagbot	Mimosa invisa	giant sensitive
Sagbot	Cassia tora	Cascara

The improved tropical pasture legumes, tropical kudzu (Pueraria phaseoloides) and centro (Centrosema pubescens) have been introduced as a cover crop by Philippine Coconut Authority technicians over the last decade. Seed is readily available from these species because it is collected during the dry season in February/March when there is little other source of income for poor farmers.

The browse species ipil-ipil yields high quality animal feed and makes idle land on each farm highly productive

The tropical legume, browse tree, Ipil-ipil (Leucaena leucocephala) has been widely grown for many decades in the Philippines on the more fertile soils but the tall Hawaiian cultivars are preferred for timber or as an ornamental plant. Moreover Presidential Decree 705 requires that growers of Ipil-ipil obtain official permission before they harvest it. This unique restriction makes utilisation of Ipil-ipil as a livestock feed difficult.

3. The water harvested rice-paddy or fishpond areas in the lowland alluvial belts cover 14% of the Province, 106,000 hectares (ANON. 1983). Approximately 2% of this area is estimated to be covered by bunds and service roads. These dry margins of paddy grow lacatan, carabao grass, wild Bermuda, the small leafed Desmodium (Desmodium triflorum) and bila bila on the dry surface areas. Para grass (Brachiaria mutica) and kumpay (Leesia hexandra) grow in the water-logged edges of paddy or in free standing water and provide valuable feed for carabao.

4. Pasture on barangay commons and areas immediately surrounding dwellings cover a small area of approximately 2% of the Province. These pastures consist of lacatan and amorsico as only these sward-forming, lawn-type grasses survive the continuous heavy grazing by horses and hand slashing.

IMPLEMENTATION

A livestock farm was selected at Bagalupa, 14 kms north of Pagadian City (8^{o}N), with an annual rainfall of 3000 mm and a minimum nine month supply of soil moisture. The LRES (ANON. 1983) estimates a drought period (Figure 1) from March until mid April for Pagadian City.

The 200 hectares was covered with cogon, patches of hagonoy and small areas of coconuts. It has a mixture of poor metamorphic soils (Oxisols), old alluvial (Entisols), and more fertile soils formed on basaltic and andesitic igneous rocks (Alfisols and Inceptisols). Analyses have shown that all these soil types are low in available phosphate.

A small area of pasture of local Guinea grass (Panicum maximum var. typica), Schofield stylo (Stylosanthese guianensis c.v. Schofield), tropical kudzu or puero (Pueraria phaseoloides), centro (Centrosema pubescens) and Siratro (Macroptilium atropurpureum c.v. Siratro) was sown with a base fertilizer of 100 kg/ha of solophos (10-20-0-12 N.P.K.S.). Initially most of the cattle grazed the cogon grassland on the farm.

The legumes established well but cuttings of local Guinea grass from the Pagadian cemetery did not thrive.

After three years of continuous heavy grazing only the already locally proven tropical kudzu and centro survived. Schofield stylo had been severely infected with anthracnose and Siratro did not fit this wet tropical niche. All of the stock farm, except five hectares of tropical kudzu in a grazing trial, was dominated by hagonoy.

A pasture rehabilitation programme was undertaken in 1980 and 1981. One hundred hectares were recultivated and planted in June to either a high yielding tussock pasture of Hamil grass (Panicum maximum var, typica c.v. Hamil). tropical kudzu and centro or the caespitose (sward forming) grass Basilisk signal (Brachiaria decumbens v.c. Basilisk), centro, and Cook stylo (Stylosanthese guianensis c.v. Cook).

Hamil and Basilisk signal grass were new introductions and tested seed was imported from Australia. They were selected because they have superior and reliable seed germination, ability to produce good seed under wet tropical conditions and a relatively high leaf percentage and dry matter digestibility compared with other wet tropical grass species grown in a similar environment in Australia. Solophos fertilizer was applied at 200 kg/ha to ensure good establishment. Cattle were dispersed or agisted and goats were housed and hand fed tropical kudzu. Fodder crops of forage sorghum and hybrid maize were also grown as a standby feed source.

Cattle grazed these newly established pastures for only three weeks after successful seed harvesting of Hamil grass in September 1980. A small herd of cattle began continuous grazing in the first dry season after sowing (February 1981).

Since 1981 these pastures have become well established and have shown their ability to keep animals gaining weight each month even during the extended dry season from December 1982 to June 1983. This has fulfilled the earlier stated first objective of the programme and the evolution of answers to objectives two and three is proceeding smoothly. Pastures may take another seven years of careful management to mature and any fertilizer maintenance requires defining.

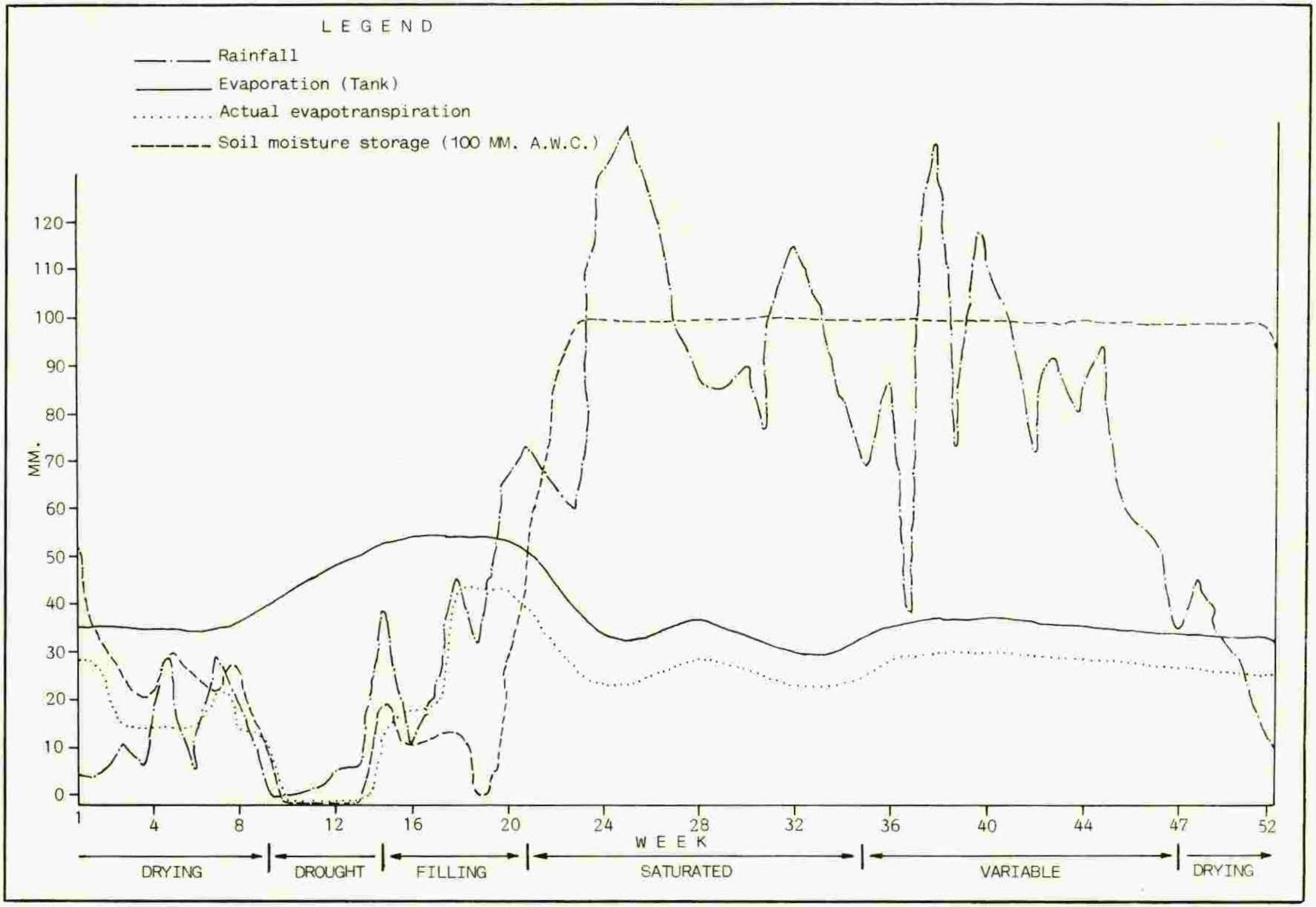


Figure 1 MEAN WEEKLY WATER BALANCE CHARACTERISTICS
Dao (1978-1982), Pagadian City, Zamboanga del Sur
From Land Resources Evaluation Survey (Anon 1983)

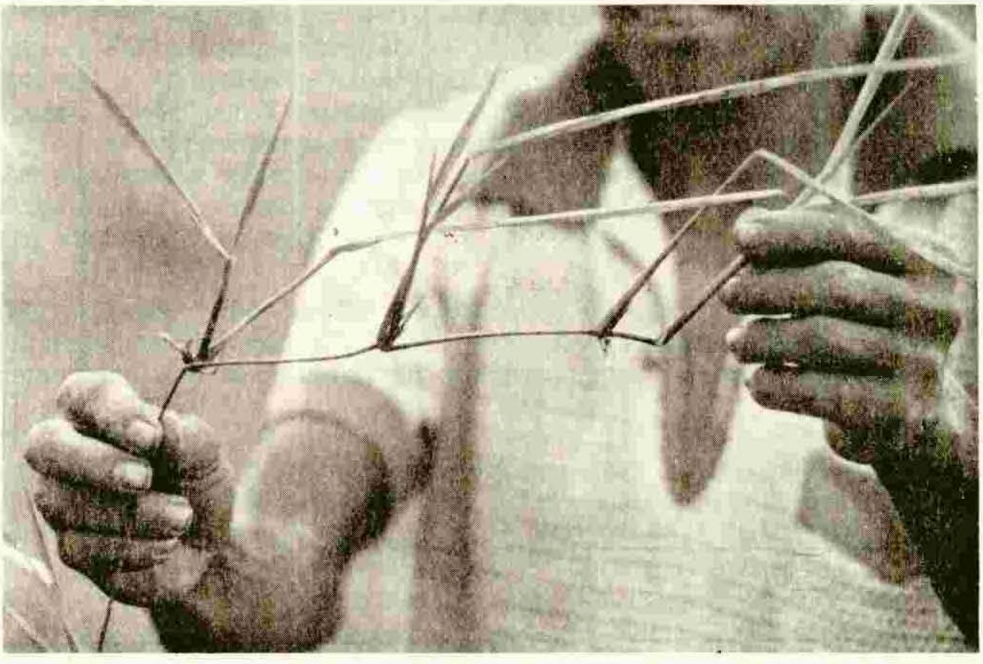
To assess which legumes would best survive and grow in the farm situation, pilot plots were established throughout the Province in 1978 and 1979 (Dalton, 1980). Schofield stylo appeared to be the forage to recommend until anthracnose infestation caused a change in the recommendations. At the same time ipil-ipil was promoted as a forage species.

In 1980 and 1981 packages of seed of two pasture mixtures were given to livestock technicians, mayors of all municipalities with livestock and to some multiple cropping technicians. The first consisted of Hamil, centro, tropical kudzu and the other Basilisk signal, centro and Cook stylo. All were shown how to establish these species and each month the technicians examined pastures at Bagalupa Stock Farm. Subsequently, in 1981 and 1982 key farmers were given hog wire fencing, fertilizer, goat sheds of locally made bamboo, and goats to demonstrate the use of these pastures. In 1983 only cuttings of signal grass and seeds of centro, tropical kudzu and ipil-ipil were supplied in an expanded, low input cost, extension programme.

Results and Recommendations

(1) The browse tree, ipil-ipil, is the species of choice for erosion control and a year round supply (20,000 kg/yr Drymatter) of high quality forage. Now that it has been shown to be a safe feed for ruminants, with the correct gut flora, by research at (a) BPI Ciawi, Bogor, Indonesia and (b) CSIRO, Townsville, Australia, investigation into better methods of use of this under-utilized browse should receive high priority. Ipil grows well on the better soils except where water logging occurs but on the poorer metamorphically derived soils a complete fertilizer (14-14-14-12) is required.

(2) Sward forming grass species which are easily transplanted by rooted tiller or runners, such as Basilisk signal grass or the related species and 1983 introduction, Tully grass (Brachiaria humidicola) are both very efficient users of scarce available phosphate in the low fertility soils of ZdS.



Rooted cuttings of sward forming grasses like this Tully grass grow quickly and can be grazed after 5 months

When combined with centro and tropical kudzu using either seed or runners as planting material and without fertilizer, this mixed tropical pasture is estimated to provide year round feed (10,000 kg/ha/year dry matter). Unlike tussock grasses, the tight sward covers all the bare ground and germination or establishment of hagonoy seedlings is prevented. Hagonoy does not dominate managed signal grass pastures at Bagalupa Stock Farm

These sward forming grasses and trailing legumes have yet to be proven under continuous extremely heavy grazing such as in small areas of barangay commons, but in these conditions the prostrate creeping legumes, hetero (Desmodium heterophyllum) and triflorum (Desmodium triflorum) do survive along with the local grasses, amorsico and lacatan.

Signal and Tully grasses with centro and tropical kudzu are recommended for all soil types in preference to the lower yielding, sward forming star grasses (Cynodon nlemfluensis) because star grass is likely to become a major weed in cultivation and the feeding of livestock is secondary to crop production in all areas except steep hillsides. These two sward grasses grow vigorously under coconuts and an extension programme to improve pastures in this vastly under-utilized coconut producing area is in progress.

(3) For maximum cut and carry production, plus some restricted, then heavy grazing in the dry season, Hamil grass has proven an ideal species. This tussock species produces good local seed but planting by cutting is preferred since this technique is widely used in transplanting rice seedlings. A Hamil, centro, tropical kudzu mixed pasture provides an estimated 12,000 kg/ha/year of dry matter on the better basalt soils. As cut and carry this is sufficient yearly feed for thirty Anglo-Nubian does or two Brahman cows and calves or two carabao weighing a total animal weight of 1050 kg.

If this pasture is carefully managed by resting in the first two to three months of the wet season, when other local grasses are readily available, good grazing is available for the remainder of the year but at half the stocking rate of that discussed above. Because of open space between the tussocks after harvesting or grazing, hagonoy requires control by hand slashing or digging out in the mid wet season (August) and especially before seeding time in January.

(4) For the waterlogged areas, in the lowlands, Para grass and kumpay are the outstanding species. Para grass, a close relative of signal and Tully grass combines well with centro and tropical kudzu in upland situations but provides slightly less production than signal grass. Because of its higher palatability it is much more dificult to manage where neighbours' animals roam without restraint.

PROBLEMS

The major problems in animal feed production, and therefore ruminant production, are largely related to the training of technicians and extension of proven methods of growing pasture to farmers. These are:

(1) It is difficult to train technologists in this new concept of pasture production. The notion of providing adequate feed for grazing animals when technicians observe an inadequate human food supply especially during the dry season is unappealing.

(2) Few technicians get practical experience in establishing, using and managing pasture for animal feed and therefore they do not understand the land preparation and timeliness of sowing problems of the farmer-cooperator learning new techniques. Most training experience has previously been from books or seminars.

(3) A major socio-economic problem for successful pasture establishment and use is the lack of fences. Most farmers cannot afford to construct a wire fence. In ZdS livestock are tethered in the cropping season but are usually left to roam in the dry season. Small areas of highly palatable unfenced improved pastures will be heavily grazed by neighbours' animals and if the farmer does not benefit from his effort in establishing a pasture he will lose enthusiasm.

A possible answer may be to use a local thorny tropical legume tree species such as camanchiles or Manila thorn (Pithecellobium dulce) as a living fence or hedge. These species may be grown as boundary fences following much the same example as in the enclosure system of England in the early 1800's where Hawthorn and briar fences allowed for individual management of small areas of land.

(4) The low fertility soil situation such as on the metamorphically derived soils or sediments may require fertilizer addition for pasture maintenance. Inputs of phosphate, calcium and sulphur fertilizers require further agronomic and economic elucidation.

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CATTLE FOR DRAUGHT

Fabian C. Sweeney - Pasture Agronomist

BACKGROUND

The local cattle in Zamboanga del Sur (ZdS) are small, humpless, Taurine, China-yellow types (Bos taurus) with a mature male weight of 250 kg. at 3 years. It is thought that they originated from Chinese Yellow and Mexican Black breeds (Mason 1969). Most have been introduced from the central Visayas region of the Philippines with the pioneering immigrants over the last 40 years.

Synnot (1978) and Denning (1980) both identified a serious deficit of approximately 28,000 draught animals in Zamboanga del Sur. In one upland barangay, 67% of households surveyed used only manual labour for cultivation. Synnot's survey also suggested that inbreeding of local cattle was a major problem.

Large Zebu or Indicine cattle (Bos indicus) are preferred for upland draught-use in other parts of the Philippines, (Batangas, Northern Luzon, Eastern Mindanao) and generally throughout Asia. Although there is negligible use of cattle for draught in Zamboanga del Sur, the livestock surveys (Synnot 1978) showed that owners preferred cattle to carabao in upland areas.

The Philippines method of draught animal ploughing, frequently in small 0.1 hectare bunded fields, is to use a single hitch animal with a bent wooden yoke over the neck pulling rope traces from just in front of the shoulder of the animal back to a swingle bar directly hitched to a locally made steel plough, The plough must be easily carried to the field on the shoulders of the ploughman. The cultivated area is usually 0.1 ha per day when using carabao or swamp buffalo (Bos bubalus).

The local cattle are too small for this single hitch ploughing operation and therefore the carabao, which is a slow, inefficient dissipator of heat, weighing 500 to 700 kg, is used.

As a result of the severe long term constraint on upland cultivation caused by this draught animal shortage ZDSDP started a local cattle upgrading programme in 1978 by lending bulls to trained caretakers in each cattle breeding municipality.

An increased cattle population is also required in the Philippines to reduce imports of bovine origin and resultant hard currency out-go amounting to US $125 millions in 1982.

The Philippines Bureau of Animal Industry (BAI) began a cattle upgrading project in ZdS in the early 50's with the importation and dispersal of Bali cows (Bos banteng) in the Lantungan and Aurora areas and small improved crossbred offspring from this introduction can be seen today. Since 1980 a further two BAI importations and dispersals consisting of 100 Brahman and 100 Santa Gertrudis cows have increased the number of large sized cattle whose offspring will improve the total cattle herd of the Province.

OBJECTIVES

The objectives of the cattle project are to:

(a) Breed good tempered, quick maturing, parasite resistant draught cattle which when fed improved tropical legumes and grasses weigh 400-500 kg at four years of age, are easily trained for the plough and are economic for the small farmer to maintain.

(b) Train Ministry of Agriculture (MA) technicians, and through them farmers, in better methods of animal production and use.

Methods used to achieve these objectives are to:

1. Introduce draught-cattle breed types such as Brahman cows and bulls and Chianina and Simmental cross-bred bulls and use the male offspring for crossing with local cows to obtain immediate benefits in size and hybrid vigour.

2. Maintain a breeding source of suitable tropical breeds for bull production and for a continuous bull loan upgrading project.

3. Provide loan bulls, improved pasture types and a training package to caretakers in each cattle breeding municipality throughout the Province so that improved male and female offspring of local cows can be trained for work.

4. Train livestock technicians in the maintenance and training of offspring, better methods of feeding, managing, training and working these animals and extending this knowledge to small farmers.

OUTCOMES

1. Introduction of suitable draught cattle breeds followed the stated intentions of the initial PADAP Memorandum of Agreement between the Philippine's Department of Agriculture and Department of Public Highways as executors of PADAP (Anon. 1978). All cattle have been purchased from the island of Mindanao or Basilan.

Zebu (Brahman) cattle of the Hudgins (Manso) type were introduced from Texas, U.S.A. to ANSA Farms in South Cotabato, Mindanao in 1968/69 and crossed with local Zebu (Nellore or Ongole) type cows. F2 and F3 progeny of these importations were introduced to Bagalupa Stock Farm (BSF) in 1977 and similar type heifers were purchased from the Sarangani stud at General Santos. Sixteen crossbred and pure Hudgins type Brahman bulls were also purchased from ANSA farms and in 1979 six Nellore/Ongole type bulls of doubtful temperament were imported from Basilan, near Zamboanga City.

As with other livestock imports in the Philippines the introduction of these cattle to Bagalupa Stock Farm was undertaken before sufficient feed in terms of good legume and grass tropical pastures had been established.

Figure 1 shows average liveweights for the Brahman and native cow herds at Bagalupa Stock Farm from 1977 to 1981.

There was an average liveweight gain in 1978 but weight losses occurred in 1979. Serious weight loss began during an extended wet season in late 1979

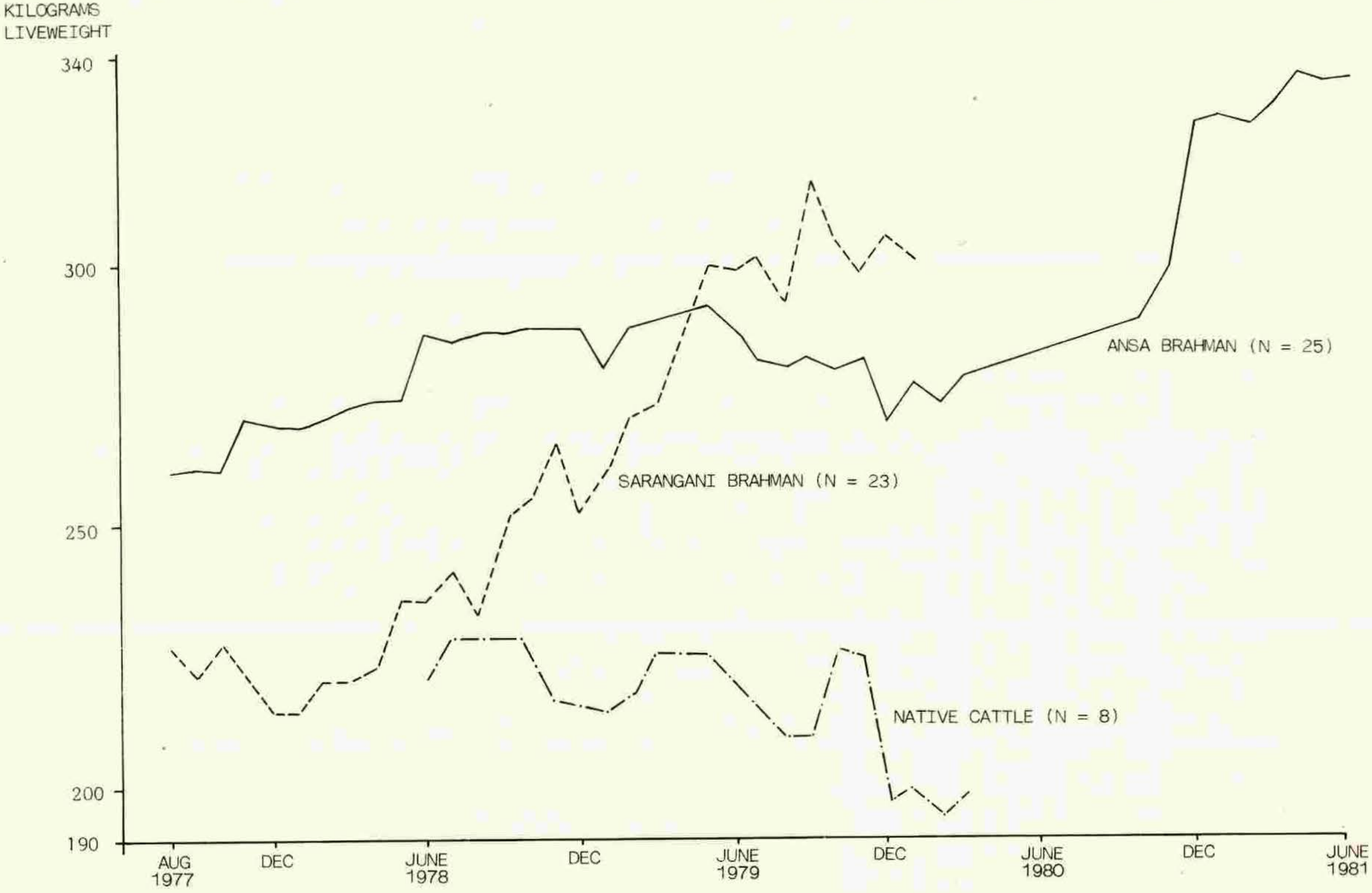


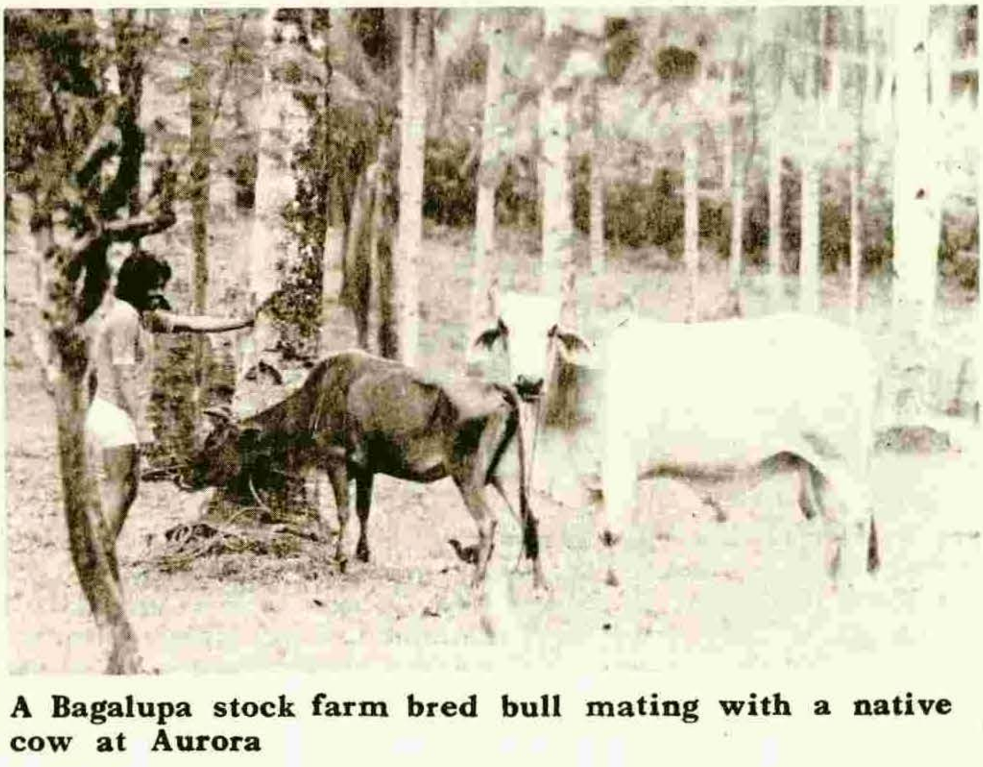
FIGURE - 1 - LIVEWEIGHT OF BRAHMAN AND NATIVE COWS AT BAGALUPA STOCK FARM ZAMBOANGA DEL SUR, PHILIPPINES. 1977 - 1981 and early 1980 so that by April of the dry season a majority of these cattle were in very poor condition and had to be temporarily dispersed from Bagalupa Stock Farm. More suitable legume and grass pastures were established in 1980 and 1981 so that the cattle project could continue (Sweeney 1980).

Compensatory liveweight gains began in September 1980 once sufficient pasture and fodder crop became available for the reduced number (30) of Brahman cows in the breeding herd.

To overcome likely future problems of fertility found in some pure Brahman breeding lines six half Brahman and half large European draught-type bulls (Chianina, Simmental and Marchegiana) were imported from ANSA Farms in 1981.

2. Bagalupa Stock Farm was established to maintain a source of suitable draught-cattle and later goat breeds. Maintenance of these animals implies that the management firstly provides a suitable feed source.

The breeding programme is to provide 75 bulls for loan in the Province between 1978 and 1985, and then produce 9 replacement bulls per year which allows for a 12% wastage caused by deaths or replacement after 8 years service.



A Bagalupa stock farm bred bull mating with a native cow at Aurora

The target base herd of cows is 7/8 (F3) Brahman, and a crisscross programme using Brahman, 1/2 Chianina, Simmental or Marchegiana bulls introduces hybrid vigour, size and other draught type genes into the programme. Size (400-500 kg) and draught-cattle temperament are the initial culling factors, followed by fertility now that a suitable feeding regime has been introduced.

Continuity of breeding policy in this long term (10 to 15 years) subproject has been a problem and several major changes of cattle numbers at BSF initially caused by a feed shortage, has delayed availability of locally bred bulls.

3. The bull loan sub-project aims to have 75 bulls dispersed, with at least two bulls going to caretakers in each major cattle breeding municipality in the Province. By July 1983, 53 bulls had been lent, 3415 cows had been served and 1671 offspring born.

Bulls are planned to be transferred between municipalities every two years to prevent inbreeding and caretakers are required to grow adequate legume and grass pastures so that the bull is maintained and serves efficiently.

A recent survey showed that 60% of farmers using loan bulls have coconuts and 30% of all farmers have idle land (Ole, 1983). The average area of land managed is 4.7 hectares, 55% are owner operators, 4% part owners and the remainder tenants.

Of the 203 progeny surveyed, 13% were intended for draught in the future and 20% were sold at an average age of 14 months and price of ₱1,239.

The reasons why progeny were sold were:

Educational Expenses	33%
Food Purchases	25%
Medical Expenses	13%
Farm expenses	13%
Other	16%

The new and the old. Draught cattle from loan bull crosses make for efficient local transport.

However, most offspring of improved loan bulls are still too young for any impact to be now seen on the Zamboanga del Sur draught animal population. Experience elsewhere in Luzon and South Cotabato suggests that it takes upwards of three cattle generations (i.e. 10 to 12 years) for any impact of draught cattle use in the upland areas to be obvious.

In the cow dispersal sub-project 251 cows have been dispersed to cowless farmers, so that;

(a) More accurate observations of productivity and management problems can be made in the farm situation and

(b) a larger (than BSF) dispersed Brahman herd may produce bulls for the bull loan programme and share females and castrates for dispersal to other cattleless small farmers.

4. Livestock technicians in the BAI within the Philippines Ministry of Agriculture traditionally perceive their role as solely promoting animal health by vaccination, deworming, and by quarantine measures. The priority given to the disease - preventive or disease - curative aspects against livestock production methods in the Philippines by officers of the BAI, where senior staff are frequently veterinarians trained at the University of the Philippines, needs readjusting as discussed in the Memoirs of the inaugural Director of the BAI. (Buencamino 1977).

The objective of the ZDSDP training programme is to re-orient livestock technicians towards animal production through better feeding.

Previously little importance has been given to growing suitable pastures for animal production in the Southern Philippines. A major programme of retraining livestock technicians began in 1980 with the growing of tropical pastures on their own farms or in their municipality so that each technician learns by doing, rather than by book or exhortation.

70% of the Province's livestock technicians now have experience in pasture establishment but the more difficult problem, or 'art' of pasture management so that pastures survive and remain productive will take much longer to learn. Further training may be required after termination of ZDSDP in 1985.

Problems in obtaining objectives have been:

(1) The supply of adequate feed.

- (a) At the loan bull production stage at BSF; and
- (b) by the caretaker who has to maintain a 500 to 800 kg. bull in fit condition for serving up to 120 cows per year.

(2) A reliable supply of transport to move bulls throughout the Province.

(3) Poor animal branding identification, and record keeping, so that progress is not monitored and analysed regularly.

(4) Unproductive and sterile animals are not culled for slaughter because of audit requirements and slow communications with the central office of the BAI in Manila.

(5) Inadequate farmer follow-up by the local livestock technician because of lack of incentives and personal transport.

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GOATS

David K. Hitchcock - Livestock and Extension Specialist

INTRODUCTION

Goats play an important role in the agricultural development of small farmholders in Zamboanga del Sur (ZdS). They not only provide meat, milk, fibre and skin but also a wide range of other economic and social benefits. A survey by Synnot (1978) in ZdS suggested that there are a number of benefits which motivate small farmers to own and rear goats. They provide food and financial security in the form of a saleable asset. Unpaid family labour can be put to effective use by tending the animals and through sale and sharing of off-spring the total farm enterprise can be strengthened. There is also prestige in goat ownership.

Farmers in ZdS were very keen to use improved bucks or semen to rear better goats and increase the productivity of the enterprise. This emphasises the need to provide good quality germplasm from appropriate breeds to improve goat productivity. An effective goat extension service is also needed to ensure efficient on-farm management. The survey also highlighted the need to develop appropriate feeding systems.

Local goats are small-framed with a mature weight of approximately 20 kg. They have a variable coat colour. They were probably introduced from North Africa and Arabia with the first Moslem missionaries some 600 years ago. The breed has evolved by indiscriminate mating. Natural selection has produced a hardy animal that has survived in spite of neglect and poor feeding management. Small numbers owned by farmers makes culling and therefore genetic improvement difficult.

A native and a crossbred doe

Synnot's (1978) survey has shown that there is considerable variation within the native goat population indicating that genetic gains from selection within the local breed may be possible. However, large numbers of animals would need to be bred and vigorously culled. Genetic improvement would be relatively slow.

With a view to increasing meat production from goats at a faster rate, a cross-breeding programme using exotic breeds as improvers was considered. It was decided to commence the goat breeding and dispersal programme in 1978 and bucks were purchased to upgrade the native animal.

OBJECTIVES

In 1980 5 Anglo-Nubian bucks and 15 does were imported from Australia, and 50 local female goats were purchased. A purebred nucleus herd of Anglo-Nubian does was established at Bagalupa Stock Farm (BSF) to provide cross-bred bucks for the loan programme.

The present objectives of the goat project are:

(1) To provide a continuing source of improved types of goats in the Province.

(2) To promote and demonstrate suitable feeding and management practices to sustain those goats on small farms by establishing demonstration farms.

(3) To assist line agencies and other organisations in the development of training centres for livestock technicians and developing a ruminant animal extension service for smallholders in the Province.

(4) To form a competent and enthusiastic ruminant team within the Ministry of Agriculture (MA).

PROJECT DEVELOPMENT AND OUTCOMES

1. Breeding Improved Goats

Management methods used in the barangay suggested that goats could be grazed in the open (Synnot 1978). However 47% mortality of adult does occurred at BSF during the 1979 wet season. This was due to poor feeding and inadequate disease management.

Changes in management procedures at BSF included:

- Establishment of improved pastures.
- Housing goats in sheds with raised floors.
- Goats were fed cut and carry green crops when unable to graze.
- Strategic supplementary feeding with concentrates.
- Monthly drenching against round worms, flat worms and fluke.
- Controlled mating aimed at annual kidding.

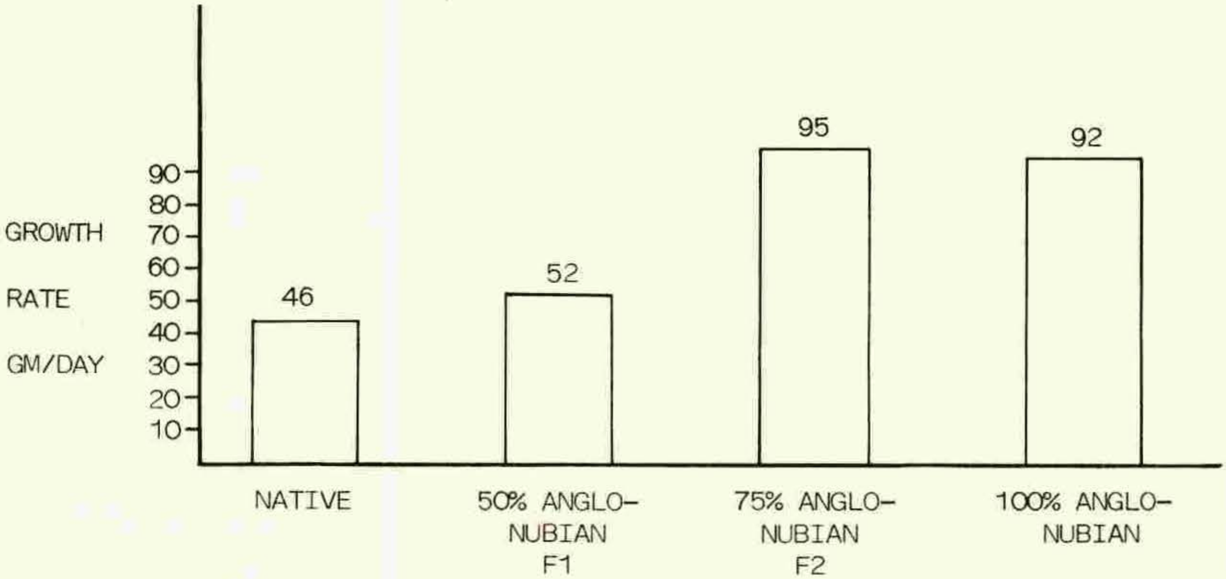
Kid mortality has been reduced to 15% and adult mortality to 7% since the improved management techniques were implemented.

Flock performance data such as weight gains, kid mortalities and milk yields have been recorded in order to make comparisons between pure-bred, cross-bred and native goats (Vaughan pers. comm). The results are summarised below:

(1) In 1982 the growth of the F1 (50% Anglo-Nubian) progeny up to weaning seemed to be limited by the low milk supply of the native dam. The F2 (75% Anglo-Nubian) clearly showed the effect of increased milk supply in the crossbred dam (Figure 1).

FIGURE 1

GROWTH RATES OF KIDS AT BAGALUPA STOCK FARM FROM BIRTH TO 4 MONTHS OF AGE IN 1982



(2) Post-weaning growth rates for the crossbred animals were greater than for the native animals.

(3) Twin kid mortality was highest in the native flock. Better milk supply in crossbred dams may explain the difference. This was reflected in the higher pre-weaning weight gain of single F1 kids compared to twin F1 kids.

(4) Milk production yields for F1 crossbreds were greater than for natives.

Overall improvement in performance of the crossbred will vary depending on the potential of the native breed and the degree of improvement introduced by management.

The 75% Anglo-Nubian goat shows improvement over half breds in growth rates but the problem of survival in the barangay situation becomes acute. Therefore, the current policy is to concentrate breeding in the barangay at the 50% level and practice selection and inter-se mating for stabilising the derived breed.

2. Goat Projects

A number of projects have been started in association with the breeding activities at BSF.

(a) Buck Loan

A buck loan project was begun in 1979 and since then 92 bucks have been loaned. The total number of does mated to July 1983 was 178 producing 1,312 kids. This project has had wide farmer acceptance. However, during the dry season a shortage of water and feed may occur, especially for the heavier pure-bred bucks. Improved pasture areas are recommended to be planted (refer Chapter 22) together with supplementary feeding small amounts of rice bran.

Bucks ready to be loaned

(b) Key Farmers

In 1981 a goat management package was devised using a combination of farm tested and "best-bet" technologies.

Each farmer was provided with legume seed and grass cuttings to establish an improved pasture area (0.5–1.0 ha). These areas were fertilized and fenced with hog wire. A goat shed was constructed and each farmer was given 10 native doelings and a pure bred buck.

Initially all farmers attempted to fully feed by cut-and-carry but limited labour soon forced them to adopt a combined system of grazing and cut-and-carry utilising both improved and native pastures.

All goats were drenched monthly with "Systemex" as a precaution against helminth parasites and vaccinated with "2-in-1" against clostridial diseases.

Farmers were advised to feed whatever concentrates they had available as a supplement to pasture. No mineral supplements other than common salt were provided.

Early field evaluation of these key farms revealed that there was no difference in weight gains between the farmer's goats and a control group of native goats at Bagalupa Stock Farm. Apparently the system of management was satisfactory. Large differences between farmers were recorded indicating that even with a fairly uniform system of management the skill of the farmer as a stockman will have a significant effect on the performance of the new system.

A budgetary analysis (Table 1) showed that profitability was similar to that obtained from cropping enterprises. However, capital outlay was considered too high.

TABLE 1

A COMPARISON OF RETURNS AND LABOUR INPUTS FOR THREE CROPPING SYSTEMS AND A GOAT ENTERPRISE

	Net Receipts* ₱	Man days
Native corn - corn	508	46
Upland rice - mungbean	994	88
Upland rice - soybean	1630	86
Goat enterprise	1006	50

* These figures are net receipts i.e. gross receipts minus cash costs excluding labour costs.

These analyses influenced the subsequent development of the farm demonstration package. Initial capital outlay had to be reduced to obtain adoption of the system by farmers. Training of farmers and farm technicians was also seen to be critical.

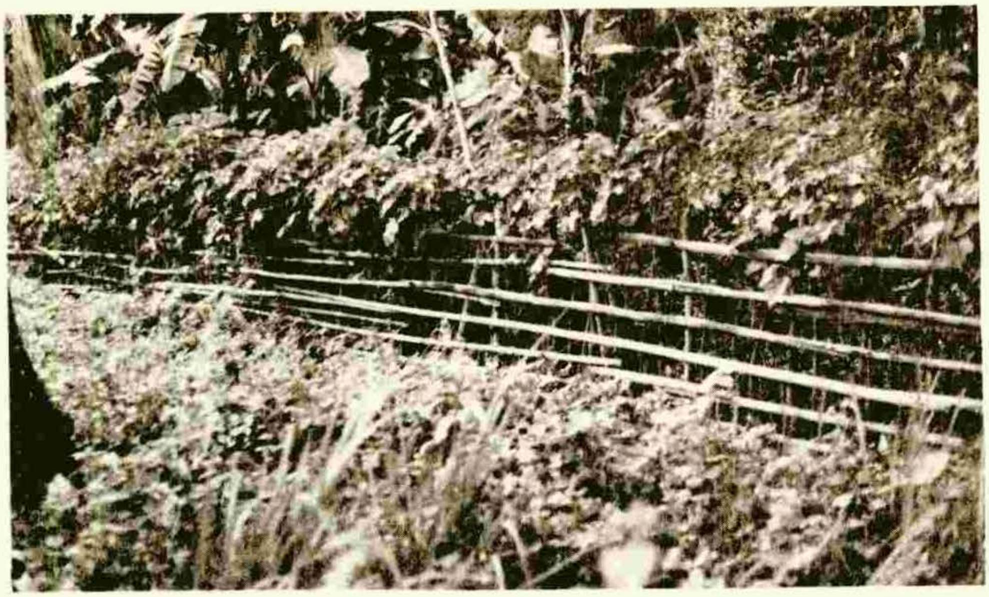
(c) Farm Technician Demonstration Farms

The concept of the technician managed demonstration farm has been introduced to incorporate training and field evaluation of the technology package on different soil types and under different management conditions.

One or more of these demonstration farms have been established within each municipality and are supervised by a livestock technician. It provides an accessible source of improved grass cuttings and legume seed and the improved buck is available for loan to other farmers in the area. The demonstration farm is also used as a training centre for farmers.

All farms are sited so that they can be viewed by a large number of people and are easily supervised by the technicians. The farmers chosen are typical of surrounding farmers regarding income and farm size and are generally well accepted in the community.

The first step in the development of the demonstration farm is to establish pasture that will provide adequate feed for goats during the dry season (refer Chapter 22). To establish and manage pasture, fences are needed. However, most farmers cannot afford to construct barbed wire or hog wire fences. Therefore, temporary fences of locally grown material such as bamboo, madre de cacao posts, and coconut fronds are constructed during which living fences are established. These fences protect the goats from bad weather and predators.



An established living fence enclosing improved pasture

Once the pasture and living fences have been fully established a small goat shed is constructed out of cheap locally available materials (bamboo, nipa) and three native doelings are supplied. The does are owned by the farmer under the condition that three doelings are to be returned to the project within three breeding seasons. These will be used by the technician to establish another demonstration farm within his municipality. A grade buck (50%-75% Exotic) is supplied once the farmer shows that he can look after the does.

Throughout the development of the demonstration farm both the technician and the farmer attend training courses. The one-day workshops cover all aspects of goat management including monitoring and evaluation of the goat management package.

Goats are housed in raised floor shed

3. Training and Extension

The achievement of change can only be brought about by technologies that are acceptable to the farmer. The success of any technological innovation rests with on-farm testing, together with a multi-disciplinary and integrated farm system approach.

The demonstration farms are areas of technology verification. They are also used to train technicians. Once the technology has been proven to be appropriate it is extended to the farming community. The technicians are trained to a level of competency to undertake this task.

Technician Training

The livestock section within the MA is an excellent vehicle to mount an extension programme as there are 54 livestock technicians scattered throughout the Province.

However, they have historically perceived their role as one of promoting animal care rather than animal production. This has weakened the MA's livestock production thrust since more time is spent on cure by vaccinations and other treatments than on prevention of disease and promotion of better feeding and husbandry systems.

The livestock technicians and supervisors are therefore being trained in extension methodology and are continually informed of the research developments within the livestock programme and of better livestock management systems.

Extension Programme

To ensure continued agricultural development in the Province, it is important that appropriate technologies are disseminated to as broad a rural audience as possible. To achieve this, an extension programme was established to provide a continuous flow of information to farmers and to create awareness of the possiblities of improved livestock management.

The methodology, target audience and evaluation of the extension programme is similar in concept to the Multiple Cropping Extension Programme. It relies on the production of good extension material. A series of comics and one-page pamphlets are being produced in both English and Visayan, covering specific management technologies. Audio Visual material has been produced which compliments the written material. Radio and press coverage is used for topical information dissemination.

Contact with schools, Agricultural Colleges and Community Groups enables the information to be disseminated to a wider audience and is reinforced by farm field trips, discussion groups and training courses.

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POULTRY

Alastair B. Carnegie - Animal Nutritionist

INTRODUCTION

The poultry industry in Zamboanga del Sur (ZdS) is largely based on the native hens found in the countryside. In 1981 there were very few commercial layer units. The largest of these had 350 layers, and the few broiler units produced about 100 kg. per week.

Because of its remarkable scavenging ability and scant utilization of farm resources, the native hen forms an integral part of the average farm. She serves not only as a source of meat and eggs for the family but also as a small cash reserve in times of need.

Some 80% of farmers in the Province own from 4-10 hens (Synnot 1978) but their productivity is estimated to be only 40-50 eggs per hen per year (Carnegie 1982). This is comparable with the figure of 72 eggs per hen per year found by Kingston and Cresswell (1979) in their survey of 5 villages in West Java.

Egg consumption in ZdS is estimated to average one per head per week. This constitutes a minor contribution to human nutrition. Present village resources fail to meet the needs of the people to the extent that in 1981 and 1982 more than 2.5 million eggs were imported into the Province. Similarly the demand for dressed chickens could not be met.

OBJECTIVES

The poultry project was included in Phase 2 of the Zamboanga del Sur Development Project (ZDSDP) with the aim of stimulating increased production of poultry products both by:

1. Increasing the productivity of village hens (lo-tech) and
2. increasing small scale layer and broiler production (hi-tech).

1. LO-TECH PROGRAMME - IMPROVING THE PRODUCTIVITY OF VILLAGE HENS

The Philippine farmer usually pays little attention to the feeding and management of his native hens. They are frequently seen scratching around for food and occasionally they may be fed some crop left-overs. They often roost in trees so that many eggs are lost and mortality rates, particularly amongst chickens, are often very high. Little medication is used.

Sociologically native hens are an important farm animal. Of particular importance to many farmers in ZdS are native cockerels many of which are used for cockfighting and can contribute significantly to farm income if they survive. Native birds are also used as payment for labour in the fields or for special occasions such as weddings and fiestas.

The challenge to ZDSDP was to find ways to increase the productivity of these hens.

Three (3) approaches were utilized in developing a suitable management and upgrading programme.

1.1 Study of the literature.
1.2 Formation of assumptions and pilot trial.
1.3 Development of specific proposals.

1.1 Literature Study

Kingston and Cresswell (1979) found that 86.5% of the eggs laid by hens were incubated leaving only 13.5% available for family consumption or sale. While hatchability of these eggs was good at 82%, 68% of the chickens died before they reached 6 months of age with most deaths occurring in the first 6 weeks.

The growth rate of these chickens was very low taking 5 months to reach 1 kg. Cresswell and Gunawan (1979) found that these birds had the potential for 100% increases in egg production and growth rates if they were fed commercial diets. For example, Indonesian "kampung" chickens laid from 117-164 eggs per year when fed a commercial layer diet and chickens weighed 1.7 kg at 5 months of age.

An experiment conducted in Zimbawbe showed that a supplement of 40 gm of corn per head per day enabled native hens to lay approximately 100 eggs per year (Huchzermeyer 1976).

Kingston and Cresswell (1979) suggested that improvement in village chicken productivity could come about from adopting the following procedures:

(i) A simple breeding system with improved cockerels which involved F1 intermating and

(ii) feeding supplements of locally available feeds such as rice bran and corn bran with particular emphasis on creep feeding of chickens.

Cuming (1981) suggested 3 steps that could be taken to improve village hen productivity.

(i) Regular vaccination against Newcastle Disease (NCD).
(ii) Brooding and creep feeding chickens.
(iii) Restricting number of eggs the hen incubates to between 6 and 8.

McArdle (1972) suggested that a simple breeding system coupled with improved management could raise village poultry returns by as much as 50% provided that all native cockerels were exchanged for the crossbred cockerels. Both McArdle and Arboleda (1979) stressed that the proposed system must be practical and at minimum cost to the farmer.

1.2 Assumptions

The assumptions formulated about the causes of low productivity and low income from village hens are:

(i) Outbreaks of NCD, fowl cholera and fowl pox brought about by contact with other birds especially wild birds.
(ii) Neglect of chickens by hens who incubate too many eggs.
(iii) Absence of housing and nests leaving birds unprotected from

infection, natural disaster and theft and leading to losses and breakages of eggs.

(iv) Inbreeding.

(v) Insufficient feeding of both hens and chickens.

(vi) Absence of advisory services.

Pilot Trial

Seventeen (17) cooperators took part in a more detailed examination of some of these assumptions.

Each cooperator was issued with ten (10) native hens and either a native cockerel or an improved cockerel. Those with the improved cockerel had to construct a small poultry house and their birds were regularly vaccinated against NCD.

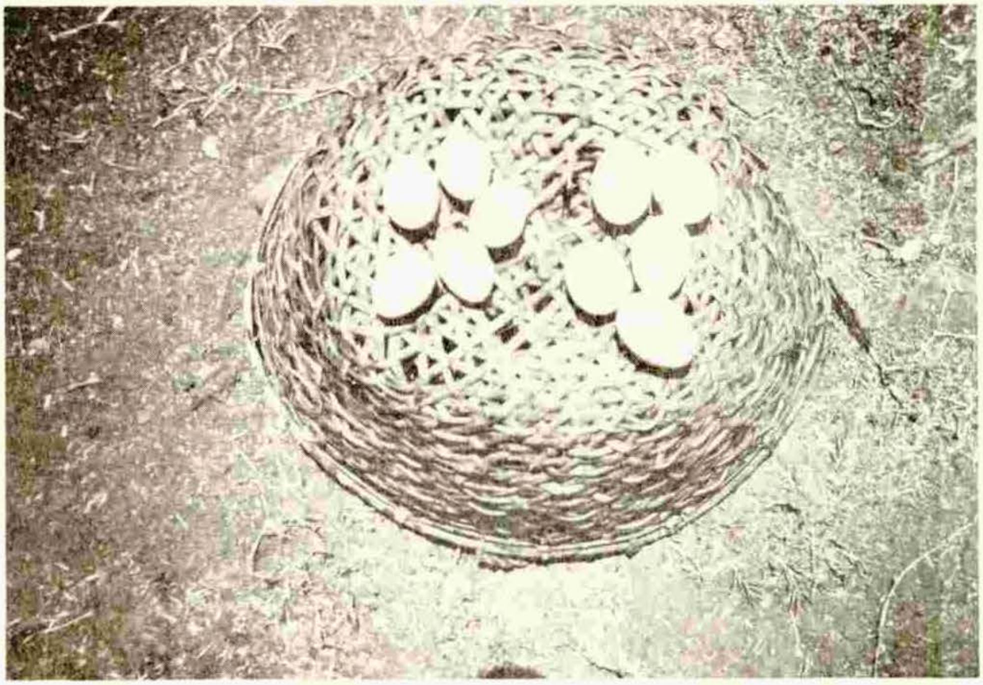
The group with the native cockerels did not have special housing but to show the effects of vaccination half of the birds in that group were vaccinated. The trial ran for 6 months.

TABLE 1

SUMMARY OF RESULTS OCTOBER 1981 - APRIL 1982

	IMPROVED COCKEREL + HOUSE	NATIVE COCKEREL - HOUSE	CONCLUSION
Average egg production per hen	24	19	More eggs collected in poultry house.
% incubated	61	60	No difference
% eaten	18	19	"
% sold	12	16	"
Average no. of chickens hatched/hen	8	7	"
No. of deaths of adult birds	12	6 vaccinated. 34 unvaccinated.	Vaccination reduces hen deaths.
Chicken Growth rate (time to reach 1 kg.)	6 months	9 months	X-bred chickens grow faster

The results showed the benefits of upgrading native chickens in terms of growth rates and providing housing and vaccination. Monitoring these farms later on in 1982 showed that F1 hens laid eggs that were 33% heavier than those from native hens (40-45 gms compared to 30-35 gms).



Eggs from native hens   Eggs from F. 1. hens

1.3 Development of Specific Proposals

The resultant farmer's guide for upgrading village poultry includes the following major recommendations.

(i) Upgrading with improved crossbred cockerels and hens. Crosses used in the ZDSDP are:

New Hampshire x Cornish,
Cornish x New Hampshire,
New Hampshire x Leghorn.

(ii) Construction of a small poultry house using locally available materials and providing 0.3 sq. metres floor space per bird.

(iii) Supplementary feeding with 40 gm of rice bran, corn bran or corn per adult bird per day.

(iv) Brooding and creep feeding chickens.

(v) Reducing number of eggs incubated to approximately 60% of those laid.

(vi) Mass dispersal to at least 15 persons in a barangay at one time to maximise the effects of the upgrading programme. Experience in the Philippines and elsewhere has confirmed the wisdom of dispersing large numbers in one area to maximise impact. Dispersal of single animals in separate locations is usually ineffective.

Recipients must:

(a) Own 6 or more native hens.
(b) Construct a small poultry house.
(c) Attend a seminar conducted by Livestock officers of the Ministry of

Agriculture (MA).
(d) Sell or slaughter their native cockerels when they receive an improved cockerel.

Recipients cannot receive both improved cockerels and improved hens.

Happy Recipients at Lakewood, Zamboanga del Sur

After 1 year the cockerel must be moved to another farmer in that area. Breeding continues with the intermating of F1's (50% native 50% improved) either from that farm or from neighbouring farms. Dispersals started in April 1982.

Results

Dispersals	1982	JAN-SEPT 1983
- Number of birds	870	1,407
- Number of recipients	470	850

Seminars have been held in Barangays in 33 municipalities and have been attended by over 4,400 farming people.

Many cooperators are now redispersing progeny to other farmers within their barangays. When receiving improved birds a farmer must agree to provide three (3) four month old hens or cockerels, for each hen or cockerel he receives, to the MA Livestock Inspector for redispersal in that barangay.

Discussion

It is too early to assess impact but initial results are encouraging. The aim to improve the management of native poultry is being achieved by seminars, dispersals and follow-up visits to cooperators conducted by Livestock Inspectors and Municipal Agricultural Officers.

The demand for seminars and dispersals exceeds the supply of birds. A Visayan comic book has been prepared for issue to recipients and an English technoguide was prepared for Livestock Officers.

Because of limited supplies of vaccines, lack of refrigeration and the difficulties and risks of limited administration, vaccination against NCD is not a requirement of the programme. However, when supplies of vaccine do become available from time to time some barangays receive mass vaccination. Implementation of a vaccination programme will reduce mortalities.

Level of Upgrading

The reasons for not advocating upgrading beyond the 50% level are:

(i)Beyond the 50% level most hens will lose the natural tendency to incubate their own eggs. Some F1's have lost this tendency already. This is not considered to be a problem as there are others to incubate the eggs.

(ii) A reduction in the scavenging ability and a possible lowering of resistance to some diseases. This latter statement is arguable but it can be assumed that regular encounters with NCD, fowl pox and fowl cholera will build up some degree of immunity in the native population.

(iii) Improvements in breeding must be accompanied by improved feeding and management. (Figure 1).

The ZDSDP is advocating an increase in supplementary feeding of birds which is realistically attainable by our cooperators. A number of farmers in the Province were already feeding at these levels.

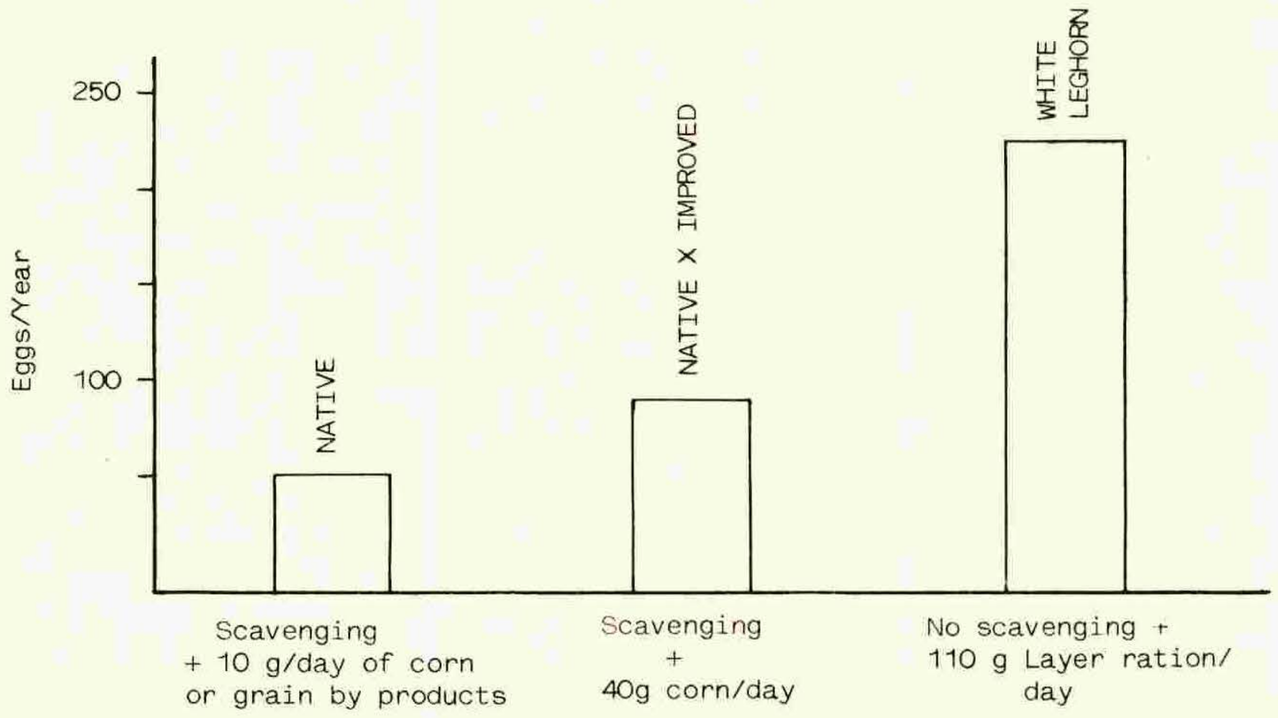


FIGURE 1.

2. HI-TECH PROGRAMME - INCREASING LAYER AND BROILER PRODUCTION

2.1 Small Scale Broiler Production

Following a pilot market survey in Pagadian in October 1981, four (4) cooperators were approached to set up broiler demonstration farms. Each cooperator constructed a broiler house to hold two batches each of one hundred (100) birds at a cost of approximately three thousand (3,000) pesos.

The monogastric team supplied birds, feeds and technical advice to each cooperator. After 2 months these cooperators expanded their production by building more sheds and new cooperators asked to join the programme.

Results

As of September 1983 the Project had eighteen (18) broiler cooperators and there are at least another thirty (30) persons who are growing broilers in ZdS. Over four thousand four hundred (4,400) dressed chickens are sold per month in the Province. Average net profit exceeds three (3) pesos per bird.

Two of the original cooperators have paid back all the money owed to the Project while the other two have paid back two thirds of their advance. All four (4) of the original cooperators made net returns exceeding 2,500 pesos in their first year.

Four Factors have facilitated this development:

(i) Supplies of day old chicks.

There is no regional hatchery in ZdS and the airlines have a 200 bird restriction per flight. This limits supplies to either 400 or 600 birds per week.

In response to an approach from the monogastric team, a company set up a hatchery in Cagayan de Oro and now supply more than 1,000 day old chickens per week to the Province.

(ii) Imitation.

The success of the 4 initial cooperators encouraged others into the field.

(iii) High Prices in the local market.

Although feed costs are approximately 15% higher in ZdS than in Cebu or Manila, local broiler prices are also higher enabling reasonable profits to be made.

(iv) Extension.

Technical advice on broiler management is provided by the monogastric team within the Ministry of Agriculture.

Problems:

(i) Marketing.

One buyer controls most of the sales in the area and he buys irregularly and as a result some cooperators experience problems with over supply of birds.

The problem is partly due to a response by new growers who are not part of the Project scheme and who have not assessed the market demand correctly. It is hoped that a recently formed poultry producers cooperative will overcome this problem.

(ii) Finance

This is the biggest problem faced by the programme. Many cooperators make a profit but do not employ the good business principle of reinvesting profits back into the business.

This problem could be solved by a 'direct broiler grant' of about 1,500 pesos per batch from the banks to be used solely for purchasing chicks and feeds. Loans of this type have been used elsewhere in the Philippines. Some loans have been arranged through the Rural Bank of Pagadian.

(iii) Feeds and Broiler Prices

Feed prices are now increasing while broiler prices remain the same so cooperators must devote greater effort to marketing their product. The Project has assisted some cooperators with PADAP feed prepared in the Bagalupa feedmill. These are approximately 15% (20 pesos per bag) cheaper than B. Meg Cebu feeds and have performed equally as well. The Project is working towards the establishment of a commercial feedmill in the Province.

2.2 Small Scale Layer Production

The techniques for large scale production should apply equally to smallholder production.

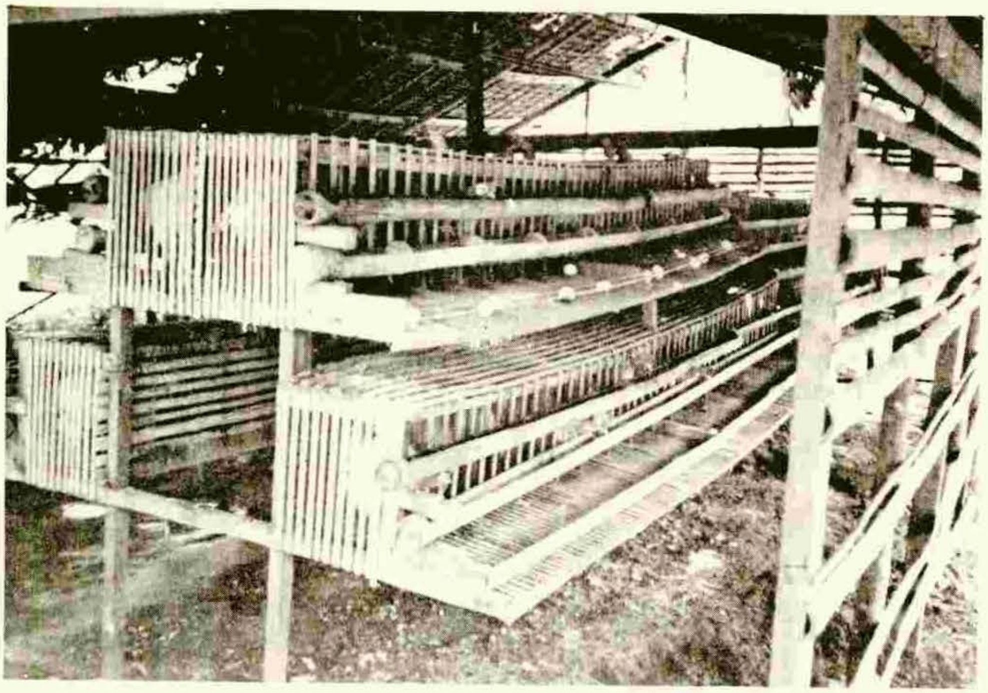
Three (3) cooperators at Margosatubig, Molave and Buenavista were assisted by ZDSDP to set up layer demonstration farms each consisting of 100 birds. These cooperators built layer houses with individual cages at a cost of around ₱2,200 per cooperator. Technical advice was provided by the monogastric team and ready-to-lay pullets were purchased. Production records were kept from the date of arrival of the birds on the farm in February 1982. Other cooperators joined the scheme during 1982 and 1983.

Results

The cooperators all achieved 65% rate of lay (65 eggs per 100 layers per day) for 6 months which if continued for one year would have given them the budgetted return of 18 pesos per bird. However, many of them were unable to sustain this level of production for a number of reasons:

(i) Cooperators do not plan their feed supplies. If layers are deprived of feed or if feeds are changed, productivity drops and some birds moult. Observations suggest that many cooperators sell eggs on credit and do not collect this money regularly for repurchasing feeds.

(ii) Cooperators spend egg receipts on other farm and household items.



A small scale layer farm

(iii) Farmers fail to provide regular medication and do not keep medicines on hand. This means minor disease problems rapidly become major ones.

(iv) Irregular water supply.

Profits have been made from the enterprise but payment of outstanding debts has been slower than in the broiler project. All 3 cooperators have expanded to 200 layers, the extra 100 being raised from day-old chickens organised by ZDSDP.

By September 1983 there were 10 layer cooperators being assisted by the ZDSDP, two of whom had less than 50 layers. All are now achieving 60% rate of lay or better.

Discussion

A better approach to layer production may be a small cooperative in one location with between 20 and 50 members, each with approximately 100 layers. Feed, medicine and marketing of eggs would be controlled by the cooperative. Funds would be supplied by the bank for inputs and sales would be remitted directly to the bank. The Bimas Ayam Project in West Java (Suyoto 1979) operates in this way.

ZDSDP staff are convinced that layer production demands higher managerial skill than does broiler production. It requires patience and budgetting skills largely beyond those of most small farmers. It is worth noting that cooperative laying schemes are operating successfully in the Philippines. An example is DOÑA REMEDIOS TRINIDAD, a KKK project with 140 small scale layer and broiler farms.

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PIGS

Alastair B. Carnegie - Animal Nutritionist

INTRODUCTION

Pig production in Zamboanga del Sur (ZdS) is predominantly a backyard industry. Data collected by Livestock Inspectors of the Ministry of Agriculture (MA) show that only 5% of the production comes from small commercial units containing 5 or more sows. The usual picture is of native or partly upgraded pigs tethered with a rope to the side of a house or tree and fed household scraps and crop residues. Under this regime of poor feeding and no protection from parasites, growth rates are low.

Synnots' Survey (1978) estimated that 58% of all households owned a pig; these pigs were weaned at an average age of 2.5 months when they weighed about 10 kg and they reached a mature weight of 60 kg at 3.5 years. Few pig breeders used artificial insemination (AI) and piglet mortality was in excess of 25%.

A further survey was conducted amongst all households in 2 barangays in each of 11 municipalities in November 1981. This survey was to be used to plan proposals for action by the Monogastric team of the MA.

Pig ownership was found to vary widely amongst these 22 barangays. 25% of the households raised one or more pigs. In some barangays up to 80% of households owned a pig but in others there were less than 10% owning a pig. The average number of pigs kept in pig-owning households was 1.7.

The survey showed that many barangays had insufficient boars to service their sows and more farmers were interested in breeding than fattening. Farmers complained that it was difficult to fatten pigs due to the high prices and/or unavailability of feeds. It was also found that 35% of pigs had some degree of improved blood. Nutrition of pigs was usually inadequate.

Of interest was the fact that 90% of pigs were held to be sold as the need arose to pay education or household expenses. Many pigs were sold below optimum weight.

OBJECTIVE

The aim of the pig project is to upgrade native pigs and to improve their level of nutrition and management.

BACKGROUND

The Ministry of Agriculture (MA) through the National Programme of the Bureau of Animal Industry (BAI) in Manila established pig production Centres at Molave, Dumalinao and Dumingag in the late 1970's. The purpose of these centres was to provide to farmers throughout ZdS to upgrade native stock improved crosses between Large White (LW), Landrace (L), Duroc (D) and Large Black (LB). A second function was to make wide use of AI. The plan was for one barangay in each municipality to receive 10 head of improved stock. A comprehensive boar loan scheme was also part of the national scheme.

In reality the national policy was not suitable for most of the pig industry in ZdS. Improved breeds are noted for their ability to use scientifically formulated rations and they require high levels of management to demonstrate their superiority over native pigs. The dispersal scheme as it operated did not work. In many cases improved LW X L, L X D or LW X D weaners were dispersed to farmers who only fed the weaners kitchen scraps and some rice bran. Instead of being housed the pigs were often tethered on muddy ground.

In one particular dispersal in September 1981 30 weaners of average weight 8-10 kg were dispersed to hill farmers, many of whom had never owned or knew how to care for a pig. The mortality rate of these weaners in the first 2 weeks was 25%.

The dispersal scheme did not follow national policies. Only a few municipalities in the Molave area received any animals and many dispersed animals were fattened and sold. Management of loan boars was usually inadequate and AI, as it was practised without semen dilution or examination, correct sanitation procedures or control of number of boar services, was of questionable benefit.

It was realised that the national objective of upgrading native pigs was not going to be achieved under the existing system.

PLAN

With the information provided by the November 1981 survey and analysis of the existing situation the following recommendations were made.

1. Retain Molave as a production centre with 8 improved sows supplying improved boars and sows to the smaller commercial piggeries in ZdS.

2. Expand the facilities at Dumalinao into a centre producing first cross weaners for dispersal. Stock with 6-8 native sows to be bred to coloured (D or LB) boars.

N.B. Coloured boars were chosen because white pigs are more susceptible to sun scald and sunburn and have lower growth rates than coloured pigs under backyard conditions.

3. Target dispersals to those barangays that have few upgraded pigs. Disperse 3-4 weaner gilts or 2 weaner boars to a barangay.

4. Assign at least one roving boar to each Integrated Area Development (IAD) in ZdS. The boar should serve sows in 1 barangay for 2 months and then be moved to a barangay in another municipality.

5. Plan pig fattening demonstrations to show the advantages of crossbred pigs and the benefits of improved nutrition and housing.

OUTCOMES

1. PIG FATTENING DEMONSTRATIONS.

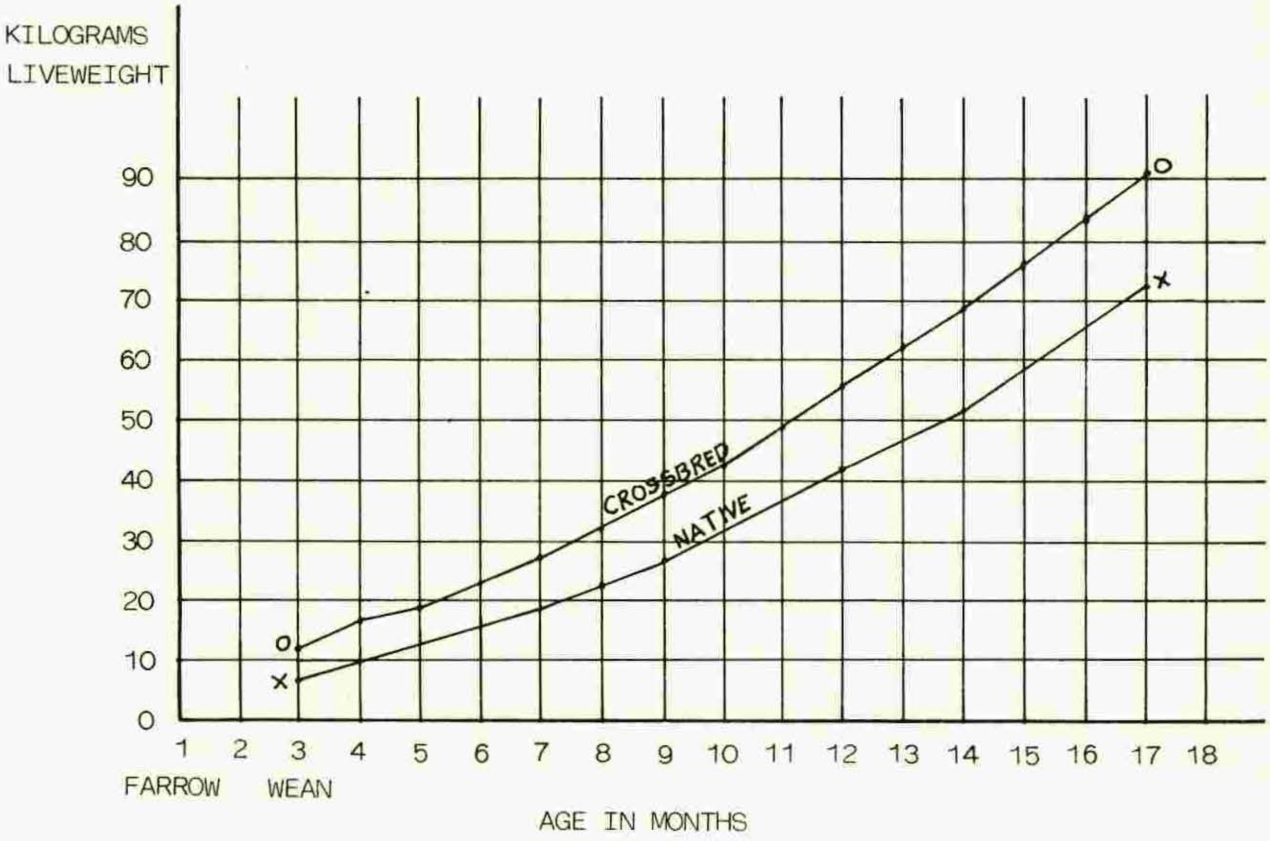
These were conducted at five locations. Each farmer was issued with four crossbred (50% native, 50% D) and four native weanlings of the same age. The weanlings were housed in raised fattening pens built from local materials such as bamboo, round timber, and nipa. They were fed a predetermined ration comprising feeds available in that location, in fixed proportions. Feeds used in the demonstrations included rice bran, corn bran, grated coconut, cassava, sweet potato, leucaena, taro and kangkong.

Liveweight and feed consumption data were recorded forthnightly.

Figure 1 presents pooled data from the five demonstrations. It clearly shows the growth rate advantages of crossbred pigs compared with native pigs.

Fig.1 PIG FATTENING DEMONSTRATIONS-ZAMBOANGA DEL SUR

GROWTH RATES OF CROSSBRED (50% native) and NATIVE PIGS



Feed conversion represented by the ratio between kilograms of feed consumed per kilogram of weight gain was also superior for the crossbred pigs. The relevant figures were 6.5 to 1 for crossbred pigs and 7.3 to 1 for the native pigs. These figures are higher than those normally reported in the literature because farmers were often forced to feed maintenance or sub-maintenance rations due to feed shortage.

Much local interest was shown in the demonstrations and after their conclusion some boars were retained for breeding purposes in the barangay.

2. DISPERSALS

The Dumalinao pig centre commenced breeding native sows to Duroc boars late in 1982. It is planned that 50 crossbred weaners will be dispersed to selected farmers in ZdS each year.

Before dispersal all weaners are acclimatized to conditions prevailing in the barangay. This involves weaners being placed in houses similar to those used in the fattening demonstrations and being fed a diet similar to that which they will receive in the barangay. As a precaution against mortality they are not dispersed at less than twenty (20) kilograms weight.

Predispersal seminars are held for recipients who must: -

(1) Have a suitable pig house.
(2) Have sufficient supplies of available feeds and water.
(3) Agree to use the weaner as a breeder and if it is a boar, mate it with at least 20 gilts/sows in the barangay per year.
(4) Return 3 head of minimum weight 20 kg to the MA for redispersal in that barangay.

By the end of September 1983, 40 weaners had been dispersed in ZdS.

3. ROVING BOAR PLAN

Two Duroc boars are now ready to be introduced into the municipalities of Lapuyan and Imelda.

4. TECHNOGUIDE

A technoguide outlining feeding and management proposals for backyard pig production has been prepared. A feature of this publication is the emphasis it gives to feeding pigs using locally available feedstuffs in fixed proportions so that a balanced diet is provided.

5. INTEGRATION

Pig pens have been constructed above some freshwater fish ponds. A slatted pen of size 2 metres x 1 metre will hold 2 weaners.

A pig weighing 45 kg will produce approximately 3.5 kg of manure per day. This manure introduces nutrients into the pond water which results in growth of water flora such as algae and plankton. These flora are a food source for Nile Tilapia.

The pigs also benefit from the system because they are fed reject or undersize fish with locally available concentrates and green feeds.

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FEEDMILL

Alastair B. Carnegie - Animal Nutritionist

INTRODUCTION

Ministry of Agriculture Livestock Officers expressed concern that there was no feedmill operating in Zamboanga del Sur (ZdS) (ZDSDP 1980). Many poultry and swine raisers had gone out of business because of high feed costs and unreliable supplies.

Raw materials were available since there were substantial supplies of rain damaged and surplus rice and corn products accummulating in warehouses. The Multiple Cropping Programme was experimenting with production of a number of crops such as yellow corn, sorghum and cowpea which could be utilized in formulating rations for monogastric livestock.

The Zamboanga del Sur Development Project (ZDSDP) Phase II study report recommended that a feasibility study be conducted into establishment of a pilot and commercial feedmill in the Province.

IMPLEMENTATION

The Australian animal nutritionist in June 1981 began to collect data to assess whether a feedmill could be successfully established in ZdS.

It was planned to proceed in 3 stages: -

1. ASSESS THE LIKELY DEMAND FOR A FEEDMILL.
2. SET UP A PILOT FEEDMILL and
3. IMPLEMENT A COMMERCIAL FEEDMILL.

Progression from one stage to the next was dependent on the successful outcome of the preceding stage.

1. ASSESSING THE LIKELY DEMAND FOR A FEEDMILL.

To assess likely demand data was collected on:

(i) Livestock numbers in each municipality.
(ii) The number of commercial producers, their size and need for a feedmill.
(iii) Consumption, imports and exports of pig and poultry products in ZdS.
(iv) Imports of commercial feeds from other Provinces.
(v) The prices of commercial feeds throughout the Province and their reliability of supply.
(vi) Relationships between feed costs and prices for pig and poultry products.

To determine the ingredients that would be available for a feedmill, data was collected on supplies of raw materials for rations in ZdS and exports of these ingredients to other Provinces. The integration of crop and livestock production was also assessed.

The status of the feedmill industry in the Philippines was investigated. The final step was to calculate least cost balanced rations using data on nutrient requirements of livestock and predicted supplies of ingredients.

The data was collected and collated in December 1981.

Commercial poultry and pig raisers accounted for about 5% of total pig and poultry production. Many others had commenced production but had gone out of business, due to the high cost and unreliability of feed supplies.

Over 80,000 chickens and 2½ million eggs were annually imported into the Province. This was balanced by exports of 40,000 native chickens and 50,000 pigs. Consumption of pig and poultry products in the Province was very low so there was potential for expansion.

Estimated importation of commercial feeds into ZdS was 32,000 bags equal to 1,600 tonnes, of which 28,000 went through retail outlets and 4,000 was imported directly by farmers. 85% of these feeds came by boat and road from Cebu and 10% from Cagayan de Oro. 80% of the feeds were for poultry and 16.5% for pigs.

Supplies of ingredients available in warehouses and trucked out of the Province indicated that there were sufficient supplies for a feedmill producing at least 5 tonnes per day (1500 tonnes per year) Refer Table 1.

TABLE 1

ESTIMATED YEARLY SUPPLIES OF SOME FEED INGREDIENTS IN ZAMBOANGA DEL SUR

FEED INGREDIENT	WAREHOUSE STOCK (1)	TRUCKED OUT OF THE PROVINCE (2)
CASSAVA	600	6,600
CORN BRAN	1,300	1,000
CORN-WHITE	5,000	12,000
CORN-YELLOW	3,000	
COPRA	2,100	24,000
DRIED FISH	400	3,000
IPIL-IPIL	20	-----
RICE	---	10,800
RICE BRAN	6,500	4,000
SORGHUM	15	-----
SOYBEAN	30	-----

(1) Summary of data collected from National Food Authority (NFA), private warehouses and millers, in 1981 and 1982.

(2) Summary of data collected from checkpoints at Molave and Kapatagan in 1981 and 1982.

There were 2 commercial and 2 private feedmills in Zamboanga City but they could not cope with local demand. Feed prices in the Province were approximately 18% higher than for the same feeds in Cebu largely due to transport costs which increased for small lots. Transport prices to other parts of ZdS and demand for feed indicated that the best site for a feedmill was Pagadian. Molave was the next preferred site.

Many farmers in ZdS would benefit from the operation of a small feedmill plant because it would provide support to both livestock and crop production which can be closely integrated.

It was theoretically possible to formulate rations based on the supply of major ingredients in the Province and imports of minor ingredients such as molasses and coconut oil. Soybean meal is available through the NFA.

It was concluded that there was a need for a feedmill in the Province and that it was a feasible project.

2. ESTABLISHING A PILOT FEEDMILL

The pilot feedmill was established at Bagalupa Stock Farm (BSF), 13 km north of Pagadian City, to make feeds for goats at BSF and for the MA/ZDSDP pig and poultry farms at Dumalinao and Lenienza which are both near Pagadian City.

The feedmill was established in a shed 7.1 m x 14.75 m and it contained a hammer and roller mill, both imported from Australia. A Faires 500 kg mixer fitted with a bucket and tube to add molasses, a hand mixer for small mixes, a Fairbanks scale and a Newlong bag closer were purchased in the Philippines.

In May 1982 a computer programme was used to calculate least cost balanced rations. Rations were mixed and feeding trials were conducted over the next year.

Data for the approximate chemical and nutrient composition of feeds used in the feedmill are given in Table 2. Table 3 shows the least cost poultry rations together with prices as at April 1983. Based on data elsewhere in the Philippines overhead and variable costs have been assumed to be 20% of ingredient costs.

Table 4 shows the calculations for the pig grower and breeder mix.

Rations are also made for ducks, goats, rabbits and cattle.

Inside the Feedmill at Bagalupa Stock Farm

TABLE 2

APPROXIMATE CHEMICAL AND NUTRIENT COMPOSITION OF SOME PHILIPPINE FEEDSTUFFS AVAILABLE IN ZAMBOANGA DEL SUR FOR MONOGASTRIC ANIMALS

SEPTEMBER 1983

	CRUDE PROTEIN %	M.E. K CAL/KG POULTRY	M.E. K CAL/KG SWINE	CRUDE FAT %	CRUDE FIBRE %	Ca %	AVAIL-ABLE P %	RECOMMEN-DED MAXIMUM INCLUSION %	COMMENTS
Cassava	2	3300	3400	0.7	2.8	0.15	0.08		Low protein restricts use for high protein rations.
Coconut Oil	0	8500	8500			0	0	5	Costly.
Copra Cake (Expeller)	19	1600	2500	11.0	9.0	0.08	0.20	10 Poultry 20 Pigs	High fibre - pigs more tolerant.
Corn Bran (Fine)	11	2200	2800	6.0	5.3	0.04	0.35		Low energy restricts use.
Corn Yellow (Grain)	8.9	3350	3150	4.0	2.0	0.02	0.10		Low Protein.
Fish (Rejects)	50.+	2400	2400	4.0	0.5	3.5	2.5	10	Unsalted and dried thoroughly-no mold to be present.
Ipil-ipil Leaf Meal	22	1000	1000	4.4	11.0	2.0	0.10	3 - 4	Mimosine, toxic to Monogastrics.
Molasses (Liquid)	2	2100	2300	0.5	0	0.60	0.04		Low Protein limits use.
Rice Bran (Fine)	12.5	2700	2800	9.5	6.5	0.08	0.55		Problems with storage beyond six weeks (rancid).
Sorghum (Grain)	9.4	3250	3200	2.5	2.4	0.05	0.11		High tannin (Dark seeds) reduces palatability.
Soybean Oil Meal	44	2400	2900	1.4	6.0	0.28	0.22		
Bone Meal (All Bone)	1.4	-	-	1.1	2.3	29	9.1	5	Mineral imbalance.
Oyster Shells	-	-	-	0	0	32	0.15		

SOURCE OF DATA:

1. Feedstuffs USA - 1974 Edition - R. Allen.
2. Nutrient composition of some Philippine Feedstuffs - A. Gerpacio and L. Castillo.
3. BPI CIAWI - Bogor, Indonesia.
4. Ingredients Analysis - BAI Feed Analysis Laboratory, Cebu.

TABLE 3.

MA/ZDSDP - RATION FORMULATION. POULTRY FEEDS AS AT APRIL 1983

	PRICE/ KG	BROILER STARTER	PRICE ₱	BROILER FINISHER	PRICE ₱	CHICK STARTER	PRICE ₱	CHICK GROWER	PRICE ₱	LAYER MASH	PRICE ₱
CORN BRAN - FINE	1.10			3.65	4.02	5.25	5.78	4.0	4.4	7.3	8.03
COCONUT OIL	4.50	1.10	4.5	1.25	5.6					0.7	3.2
FISH MEAL, LOCAL	3.50	12.0	42	9.5	33.25	9.5	33.25	11.25	39.4	11.25	39.4
COPRA MEAL EXPELLER	1.30							7.0	9.1		
OYSTER SHELL	0.25	0.75	0.2	0.5	0.1	0.5	0.1	1.0	0.3	7.0	1.8
IPIL-IPIL	0.92	5.0	4.6	5.0	4.6	5.0	4.6	5.0	4.6	4.0	3.7
CORN YELLOW	1.60	30.5	48.8	28.0	44.8	30.0	48.0	28.5	45.6	27.5	44.0
CASSAVA	0.85	10.0	8.5	10.0	8.5	10.0	8.5	10.0	8.5	10.0	8.5
RICE BRAN - FINE	1.10	15.0	16.5	15.0	16.5	15.0	16.5	15.0	16.5	15.0	16.5
MOLASSES, CANE	2.2	2.0	4.4	2.0	4.4	2.0	4.4	2.0	4.4	2.0	4.4
SOYBEAN OIL MEAL	2.92	23.5	68.6	24.85	72.5	22.5	65.7	16.0	41.7	15.0	43.8
AFSILLIN/ALGROMIX	25.0	0.25	6.25	0.25	6.25	0.25	6.25	0.25	6.25	0.25	6.25
TOTAL			204.35		200.52		193.08		180.75		179.58
COST/KILO OF FEEDMIX			2.04		2.01		1.93		1.81		1.80
COST/50 KG BAG			102.17		100.26		96.54		90.38		89.79
MIXING CHARGE+20%			20.43		20.05		19.31		18.10		17.96
MILL PRICE			123		120		116		108		108
COMPARATIVE RETAIL PRICE IN PAGADIAN			147		139		139.50		120.50		130.50
DIFFERENCE			24		19		23.50		12.50		22.50
% DIFFERENCE			16		14		17		10		17

1. All prices are quoted in local currency. Exchange rate October 1983 ₱14 = US$1.00

TABLE 4.

MA/ZDSDP MONOGASTRIC PROGRAMME

PIG GROWER RATION

(CAN ALSO BE USED AS A BREEDER RATION)

	%	PROTEIN		METABOLIZABLE ENERGY, K/cal/kg		Ca		P		PRICE/KG ₱	PRICE/100 KG ₱
		%	AMOUNT			%	AMOUNT	%	AMOUNT		
CASSAVA	15	2	0.3	3400	510	0.15	0.02	0.08	0.01	0.85	12.8
COPRAMEAL	15	19	2.85	2500	375	0.08	0.01	0.20	0.03	1.30	19.5
CORN BRAN - FINE	15	10.5	1.58	2800	420	0.04	0.006	0.30	0.045	1.10	16.5
YELLOW CORN	16	8.9	1.42	3150	504	0.02	0.003	0.09	0.014	1.60	25.6
FISH	6	50	3.0	2400	144	3.0	0.18	2.5	0.150	3.5	21.0
IPIL-IPIL	3	21	0.63	1000	30	1.98	0.06	0.09	0.003	0.92	2.8
RICE BRAN - FINE	15	11.5	1.72	2500	375	0.08	0.01	0.55	0.102	1.10	16.5
SOYBEAN	13.55	44	5.96	2900	393	0.25	0.034	0.20	0.027	2.92	39.56
AFSILLIN	0.25	-	-	-	-	-	-	-	-	22	5.5
BONE MEAL	1.20	-	-	-	-	29.0	0.348	9.1	0.109	0.10	0.12
TOTALS			17.5		2755		0.67		0.49		159.88/100 kg

	= 79.94/ 50 kg
MIXING CHARGE + 20%	15.99
MILL PRICE	= 96 / 50 kg
COMPARATIVE RETAIL PRICE IN PAGADIAN	= 116 / 50 kg
DIFFERENCE	20
% DIFFERENCE	18

3. IMPLEMENTATION OF A COMMERCIAL FEEDMILL

Discussions were held from 1981 to 1983 with a number of rice and corn millers, members of farmer cooperatives and livestock growers to elicit interest in commencing a commercial feedmill.

Two groups approached ZDSDP for assistance in planning feasibility studies and one of these groups the BALINTAWAK NEIGHBOURHOOD ASSOCIATION made an application to the KKK in November 1982 for a combined feedmill and pig project. They were endorsed by the Provincial Government and the Pagadian Council as the Anchor KKK project for the Province. Following an assessment of their project application in Pagadian, Zamboanga City and Manila further information was submitted in July 1983. At present there is no final decision.

The animal nutritionist assisted the Balintawak group in providing data and advice for their feasibility study and acts as consultant animal nutritionist.

They require advice on ration formulation, inventory management, quality control, equipment and plant layout.

OUTCOMES.

Chemical analysis of BSF rations at the Bureau of Animal Industry (BAI) Feed Service Laboratory, Cebu has shown that rations conform to National BAI standards. Testing of rations with broilers, layers, pigs and goats has given good results. The most comprehensive testing was with broilers against Cebu B Meg feeds where growth rates were comparable, or better on some occasions.

ZDSDP is the only feedmill in the Philippines to use cassava and 10% is used in most rations. Satisfactory fishmeal is also manufactured by sun drying reject unsalted fish and then hammermilling it to a meal but a commercial mill would require a drier and salt content must be strictly watched. Prices are similar to or lower than feeds available from Cebu i.e. 10-18% lower than present prices in Pagadian.

Farmers are keen to sell yellow corn and ipil-ipil and warehouses have sufficient supplies of by-product grains. There appears to be a ready supply of necessary inputs, but local production of sorghum would assist the establishment of a vigorous monogastric livestock industry.

Output is now 8-10 tonnes per month with 2 mill workers. Monthly inventories allow strict regulation of purchases of ingredients and supply of rations.

PROBLEMS

Supply of ingredients which requires financial backing from the Ministry of Agriculture and transport of ingredients and feeds to and from the mill. The mill also suffers frequent power breakdowns.

REFERENCES

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DUCKS

Alastair B. Carnegie - Monogastric Specialist

INTRODUCTION

Duck raising can be a profitable sideline for many rice farmers in the lowland areas of Zamboanga del Sur. The native or Pateros duck, commonly known as itik, is frequently found foraging in the rice fields in the Salug and Sibuguey Valleys and around Labangan, Ipil and Buug. The Muscovy or pato is the breed most commonly found in upland areas. It is a natural incubator, a good forager and produces both meat and eggs.

The main product, balut, is boiled incubated duck egg and is considered a delicacy possessing high nutritive value.

Ducks are kept on about 10% of upland farms (Synnot 1978) and the usual household owns from 1-4 ducks. Little attention is given to the management and feeding of these ducks and they exist on family and farm left overs.

In the lowlands ducks live mainly in the rice fields feeding on spilled grains, insects, snails and worms until harvest time when they are confined and are usually fed rice by-products. A few farmers add a protein concentrate to increase egg production during the confinement period.

IMPLEMENTATION OF ZDSDP DUCK PROJECT

Hetzel (1981) believes that ducks are popular in South East Asia because they are efficient foragers, can survive on a wide range of feedstuffs, are generally hardy and resistant to many of the major poultry diseases such as Newcastle Disease, Coccidiosis and Mareks disease, are easy to herd, do not readily fly away and are well adapted to a low input system. Because the Zamboanga del Sur Development Project's main goal is to assist the small upland farmers of the Province it was felt that a backyard duck project could have far reaching benefits.

To design a suitable duck project the monogastric team first conducted a survey of 20 upland and 20 lowland households that were raising ducks. This survey showed that although most farmers were aware of the main factors, which affected egg productivity such as feeding and confinement at night, little attention was given to management. Thus productivity was low.

It was felt that ducks could be raised using similar methods to those used for upgrading and managing native poultry.

DEMONSTRATION FARMS

Six demonstrations were begun on upland farms in December 1982. Each cooperator was provided with 5 Muscovy ducks and 1 drake and was expected to construct a small shed for confinement of the ducks at night time. They were given advice on feeding and general care of the animals.

Results from the demonstration farms have not shown the expected benefits. Production has generally been quite low and ducks have not been as adaptable as at first thought. Some of the problems encountered with these demonstrations have been:

1. Poor egg production because cooperators have not been prepared to provide sufficient feed. Even though ducks are good foragers they still require up to twice as much feed as hens to produce eggs.

2. High mortalities of ducklings both because of a failure to brood the ducklings during the first 6 weeks and deaths due to Newcastle disease.

Many ducklings were eaten by the neighbours' pigs on three of the cooperators farms!

3. Cooperators were not interested in either eating duck eggs or slaughtering ducks for meat. Their main interest was in incubating all the eggs and rearing as many ducklings as possible. The demonstrations have shown that the wrong criteria were used for choosing cooperators. New cooperators are now being chosen firstly for their desire to eat both duck eggs and meat and for their knowledge and interest in duck raising.

Muscovy ducks are bred and reared at the Dumalinao Pig and Duck Centre. After attending a seminar new cooperators are issued with 5 ducks and 1 drake. As with all monogastric dispersals the cooperator has a requirement to return 3 progeny back to the Ministry of Agriculture for each duck that they receive.

FUTURE

Further investigation is required before a suitable duck project for upland farms is initiated. A possible project could be duck raising in association with goat key farmers, a practice common elsewhere in the Philippines. It is also suggested that because of similar disease problems that ducks not be given to farmers already owning hens.

The monogastric project also breeds a few Khaki Campbell ducks which are sold to lowland rice farmers to cross with the Pateros.

In one study in Indonesia Khaki Campbell ducks laid 27% more eggs and had a lower feed conversion ratio than the native strains (Hetzel 1981). The Khaki Campbell could assist in upgrading the inbred Pateros ducks. However, the benefits of this cross will not be realised unless correct feeding practices are undertaken particularly during the confinement period when Pateros ducks often stop egg production because of insufficient feeding.

REFERENCES

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THE FRESHWATER FISHERIES PROJECT

Terence E. O'Sullivan - Project Agriculturist

INTRODUCTION

The Freshwater Fisheries Project (FFP) commenced in January 1981. Its objectives are to produce fish for nutrition of villagers who have no access to marine fish and secondly to diversify farm income.

Zamboanga del Sur is well supplied with freshwater springs. Indeed, this source of water for fish ponds has been a most important factor in the establishment of a successful programme. In a five month drought from December 1982 to May 1983, it was estimated that only 15% of project fish ponds dried up. They are both plentiful and productive. Furthermore, the hazard of predaceous fish common in lowland situations, is avoided.

The opportunity for ground water ponds is limited. Most ZdS soils are free - draining which means that high water table situations are limited to lowlands. Lowlands are fully utilised for wetland rice.

THE PROGRAMME

Programme design is simple. Fish fingerlings are produced at strategically located hatcheries and dispersed free-of-charge to cooperators.

Staffing

One important factor in the success of the upland fisheries programme is that there are excellent schools of fisheries in the Philippines. For example, training has been provided by SEAFDEC (South East Asia Fisheries Development and Extension Centre) at Binangonan, Rizal, which also assisted in the original hatchery design. All staff attend extension training at the Mindanao State University Institute of Fisheries Research and Development (MSU-IFRD) at Naawan, Misamis Occidental. This institution undertakes to sustain the quality of our breeding stock.

The Central Luzon State University Freshwater Aquaculture Centre is a prestigious institution whose staff have provided valuable input to this project. They are especially interested in aspects of integration of fish with other forms of animal husbandry. The system of housing pigs, chickens, ducks and goats over ponds is increasing in popularity.

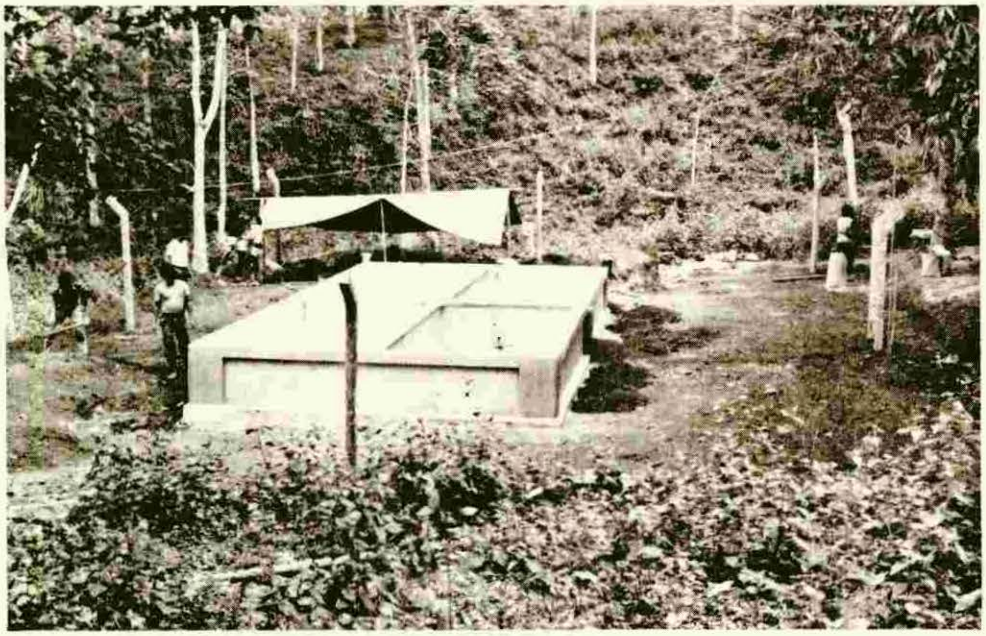
In the ZDSDP/FFP an MFFO (Municipal Freshwater Fisheries Officer) is assigned to each hatchery. He is employed by the Provincial Government. A fisheries aide is also attached to each hatchery. These and the senior supervisor are employed by the Bureau of Fisheries and Aquatic Resources (BFAR). The Ministry of Agriculture (MA) provides two supervisors who have special responsibilities to the rice/fish programme.

Thus each upland centre provides information and advice on the methodology of fish farming through an extension programme and backs up the advice with an initial injection of stock.

TECHNOLOGY

Hatcheries

Hatcheries are built according to a SEAFDEC design. They are concrete and contain two compartments. Cost of construction is US 1300 dollars.



Newly completed hatchery at Josefina, Zamboanga del Sur

The procedure followed at all municipal hatcheries is the same. They are provided with 80-120 breeders from the central hatchery in Pagadian. These are replaced once a year. The breeders occupy one compartment. At roughly monthly intervals they spawn. Laying and fertilising is followed by incubation. The female takes the fertilised eggs into her mouth for 10 days. Naturally she does not feed during this period. When the eggs hatch the newly emerged fry are transferred to the second compartment.

The second compartment is fitted with four hapa nets. The fry remain for 2 weeks in each net so that at the conclusion of their stay in the fourth net they are eight weeks old. At this stage they are 2 cm long and ready for dispersal.

Centralised fingerling production is intended to service new cooperators. Old cooperators obtain their fish from their own ponds or from farmer hatcheries which are becoming more common.

The ZDSDP hatchery programme plans to construct 4 concrete hatcheries per year. The intention is to complete 16 by the end of 1985. Production from hatcheries remains a contentious point. Management to maximise output requires further investigation. Present production is around 4000 per month for 10 months per year.

Species

The programme is unique and is very productive due to the versatility of the chosen species. That species is Tilapia nilotica (now Oreschromis niloticus). There are five Tilapia species and a cross between the Golden perch (T. honorum x T. mossambica) and T. Nilotica has produced the red off-spring known in the Philippines as the "Gintong Biyaya", the golden gift.

This red type is showing great promise under test at PADAP.

Other Species

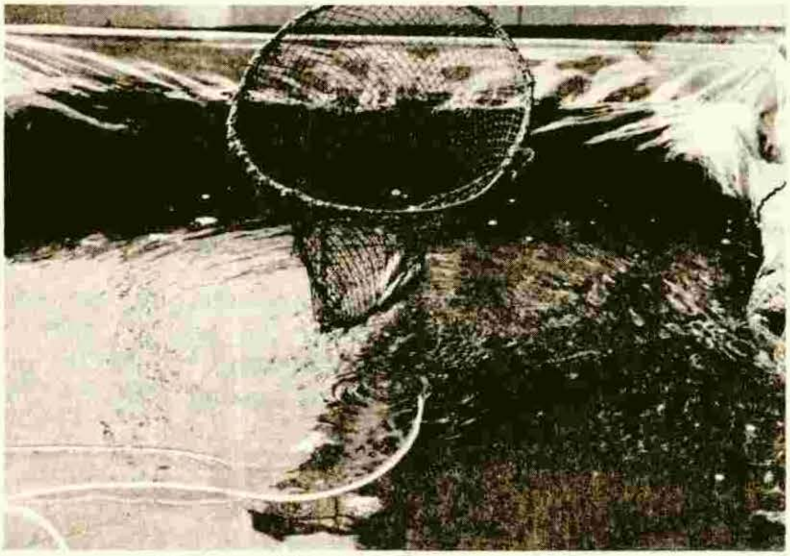
Other species considered in fish farming are bangus or milk fish; various kinds of carp such as common, silver, grass and Indian; cat fish and Kandule. When subjected to a set of selection criteria, all species except Nile Tilapia fail in one or more aspects. For example, the test of a good freshwater fish is how it rates with respect to:

1. Growth rate.
2. Cost of feeding.
3. Resistance to parasites and diseases.
4. Ease of breeding.
5. Consumer acceptability.

Bangus is cultured here but has two disadvantages; it is very bony and it is difficult to obtain fingerlings in the upland and especially in the wet season. Carp are not popular in ZdS and they are all bony, particularly the silver carp. Only common carp breeds in captivity. They are all slow to mature commonly taking 3 years. Catfish and mudfish are carnivorous which means they require expensive concentrates. In addition mudfish are fatty and predaceous on other fish. Kandule also are difficult to breed in captivity and breed only once a year. They are slow growing.

Nile Tilapia

Nile Tilapia possesses none of these disadvantages. It shares with bangus the characteristics of being a vegetarian and feeds on water flora. Thus production of Nile Tilapia has a beautiful simplicity. Provided water is warm (28^{o}C-30^{o}C) and not strongly acid (6.0-9.0) Tilapia will thrive in a nutrient bath kept fertile by manures or artificial fertilisers.



Gintong Biyaya (Red Tilapia) Bred at ZDSDP Central Hatchery at Pagadian City

Economics

A summary of a provisional budget from ZDSDP is given below.

Assumptions:

The size of the pond is 200 m^2.
The pond is stocked with 400 fingerlings with a value of ₱10/100.
The survival rate is 80%.
The pond is constructed with 15 man days labour.
Other labour for maintenance, management, harvesting and feeding is 36 man days.
Labour costs ₱10 per man day ($US 0.71).
Fish are harvested every four months allowing 3 crops per year.
At time of harvest there are 6 fish per kg.
The value of Nile Tilapia at harvest is ₱7 per kg. ($US 0.50).

Net Annual receipts

Assuming only family labour is used	₱993	($US 70.92)
Assuming all hired labour is used	₱663	($US 47.35)

Exchange rate October 1983 $US 1.00 = ₱ 14.00

THE FUTURE

The ZDSDP will have 16 hatcheries at the end of 1985. Hatcheries provide fingerlings only to new cooperators and those whose ponds dry out. In the normal course of events, breeding will have started before harvest is completed and a farmers pond will have naturally restocked.

The Project will erect a hatchery for investigatory purpose at Dao, Pagadian City where some problem solving work can be done. The Project has not conducted any problem solving work at this stage. It has been completely concerned with production. Some work will be done on increasing hatchery production.

Integrated ponds with grazing animals fertilising the pond from animal houses will increase. Grazing animals are cheaper for poorer farmers to use.

Rice/Fish appears to have some commercial potential but losses through poisoning with insecticide and through vandalism are a problem. Predaceous fish are a serious problem of irrigation areas.

The red Gintong Biyaya will be the fish of the future if they survive the scrutiny of several generations.Genetic throwbacks are a potential problem. Fish farmers like the characteristic that Gintongs breed later than Nile Tilapia. A problem with early breeding is that growth ceases with the onset of breeding and ponds become over populated with undersized fish.

Polyculture may develop using 2-3 species of fish and perhaps the crustacean Macrobrachium idella (Locon). This freshwater prawn can breed every month and does not compete with the fish population. Carp can live successfully with Nile Tilapia and can serve a useful function in stirring the pond bottom thus aiding release of nutrients.

This programme has a great deal to offer and will continue on an inter-agency basis. Indeed, after the departure of PADAP, BFAR and the Provincial Government have agreed to dual ownership of ponds with BFAR nominated as the lead agency.

MEASURING FARMER BENEFITS

B. Trevor Ole - Agricultural Economist

Measuring the benefits resulting from the agricultural programmes of the Zamboanga del Sur Development Project (ZDSDP) has been a major concern of the ZDSDP Agricultural Monitoring Team.

This paper explains how this work was conceived and carried out, what conclusions were drawn and where future priorities lie.

BASE LINE DATA

The ZDSDP relied on the 1976 Sociological Survey Report by the Institute of Philippine Culture to provide the baseline data for assessing the socio-economic impact of the Project in the Province and to define the ways in which the Project could be of assistance. A second Sociological Survey Report in 1981 detailed the socio-economic impact of the Project over the intervening period and attempted to further define those areas where the Project should be concentrating its efforts. These two reports plus existing Provincial data provided the framework within which the in-programme monitoring took place. Questions of broad impact can only be answered by such studies.

MONITORING AND EVALUATION

The delineation of monitoring and evaluation has proven to be a continual dilemma. However, the definition by Bowden (1980) seems to be the most practical and is quoted below as a reference to use when these terms are mentioned later in this text.

> "Monitoring is a routine gathering and reporting of performance data (both input and output) against measures of expected performance, the analysis of which may lead to the taking of administrative action necessary to replan the activity or reorient it towards the achievement of its original objectives."

> "Evaluation is a discrete study (one off or subsequently repeated) or analysis of project/programme data designed to determine if the inputs are optimising the achievement of objectives. The study may suggest corrective decisions for the planning and implementing of current or future projects/programmes."

THE AGRICULTURAL MONITORING TEAM

The Agricultural Monitoring Team concentrated on in-programme monitoring. It began to monitor and evaluate the Multiple Cropping Production Programme (MCPP) of the Project and to carry out limited research into the other agricultural programmes. The progress of the MCPP was monitored in terms of farmer cooperator numbers, technician numbers, repayment rates, crop areas, crop prices, farmer exit rates, input use and yields. The Team also tried to identify problems with and acceptance of the technology at the farm level. This meant that the Team had to learn more about the farmers, their families, farm resources, constraints and goals. They were required to understand the entire farming system. As implications emerged from the sources outlined in the next section, it was the job of the Team to convey this to the other agriculturists working with the production and research programmes of the MCPP.

Monitoring and evaluation was also done to check the impact of the programmes in terms of verifying the goals and purposes as set out in the logical framework matrix for the various programmes. Two major studies in this regard were the Farmer Exit Study for MCPP which evaluated programme impact in terms of farmer acceptance and adoption and the Bull Loan Progeny Survey which measured goal verification for the Livestock Development Project (LDP. 1).

The data for cooperator characteristics were obtained mainly from (1) MCPP cooperators surveys and (2) case study farmers. The surveys although aimed at collecting data on crop management, input data and yields, were also used to collect details on land tenure, land use, household composition and livestock ownership. The Case Study Farmers were established to obtain reliable data on income, expenditure, diet and farmer labour activities. These farmers were visited weekly and provided an insight into the operations of farming systems, the decision making processes of farmers, farm family aspects and the changes in all of these over time.The case study farmers were initially chosen for their involvement in MCPP. The study was then broadened to include a tree crops cooperator, a fish pond cooperator and a livestock key farmer. Five control farmers, who had no involvement with ZDSDP agricultural programmes, were then added. These farmers were selected within the categories of owner/ operator and tenant, and coconuts and open area. All of the case study farmers were easily accessible by means of all weather roads.

DEFINING THE TARGET POPULATION

The basic goal of the Project and for each of the agricultural programmes as stated in the logical framework matrices is to raise the living standards of the majority of persons in the Province. The Agricultural Monitoring Team was established after the commencement of the agricultural programmes. The first task was ascertaining just who was benefiting from these programmes. The characteristics of these cooperating farmers were then compared to the Provincial Agricultural Census data to determine where the cooperators fitted into the Provincial spectrum.

The base data for comparisons came from the 1971 Provincial Agricultural Census and from the 1976 and 1981 Sociological Survey Reports.

From the data collected in the MCPP surveys and from the Sociological Surveys, it would seem that the farmers involved in the ZDSDP agricultural programmes come from the entire cross section of farmers in the Province. That is, the ZDSDP cooperators have similar income, farm area, land tenure and household size distributions to those obtained from total Provincial data. The only factor where the ZDSDP cooperators may be atypical is that they mostly live within three kilometres of a road and therefore have access to roads and an agribusiness network.

MONITORING FARMER ACCEPTANCE

For a particular technology to have high potential for acceptance by small farmers it should achieve standards in the following criteria (relative to existing practices and situations).

(i) Profitability.
(ii) Productivity.
(iii) Not involve a great increase in labour input.

(iv) Not substantially increase the risk to the farmer.
(v) Not be too innovative.
(vi) Compatibility (with food preferences, and/or traditional agricultural practices).

Farmer cooperator surveys were used to monitor the degree of acceptance of the recommended technologies and/or their components in terms of input use, management practices and yield. This was a relatively easy approach for the Multiple Cropping Project credit production programme for there was a set population, i.e. bank borrowers in a particular cropping phase.

However, it is much more difficult to monitor farmer acceptance in a non-credit large scale extension programme where no such population list is available such as in an agro-forestry programme. To date no attempt has been made to monitor the success of such a programme. However, the monitoring procedure would consist of selecting several areas covered by programme technicians who were operating a demonstration site and running farmer training classes. Then a survey of randomly selected farmers in that barrio would be carried out to check the spread, acceptance and adoption of the technology.

Farmer exit surveys were also carried out to determine the reasons for leaving the programme and to examine the post-programme uptake and retention of technology. These surveys were especially useful in identifying the problems which farmers had encountered with the programme. Some of the details from these surveys are covered in the paper on the MCPP.

Similar work needs to be done for the other agricultural programmes to examine farmer acceptance, adoption rates and to verify that the objectives of the programme are being met.

ECONOMIC IMPACT OF AGRICULTURAL PROGRAMMES

Crop and livestock budgets were developed for most of the programmes to allow the comparison of expected benefits from a particular activity with budgets based on traditional activities. These budgets were then used to calculate break even yields to check the percentage of farmers achieving these yields. These break even yields varied across different farm types, i.e. tenants versus land owners, small household size farms versus large household size farms (in terms of family labour compared to family plus hired labour). It was then necessary to consider each of these farm types to see how they fared in terms of increased profitability from the programmes.

The case study farmers have been a very useful source of income data. Comparison of incomes from the MCPP cooperator case studies with the control studies of similar farm area and farm type showed that the incomes of the MCPP case study farmers are much higher. The use of inputs, especially fertilizers, chemicals and HYV seed, are also much greater on these MCPP case study farms. These farmers have also utilised MCPP recommendations through self financing on an expanded area of their farm. It is also interesting to note that control case study farmers derive a large portion of their total income, almost 50%, from off farm activities while the MCPP case study famers are more reliant on farm income alone with only 10 to 15% of their total income being derived from off farm sources.

This case study data together with the budget figures, the mid to upper sections of the farmer cooperator yield distributions and the research trials on farmer managed sites all indicate the potential of the MCPP crops for increasing farm income. While it may be wrong to assume that this additional income, generated through the MCPP, will be reinvested on the farm; it is the responsibility of the extension staff to inform the farmers that other programmes are available for the purpose of reinvestment. An example of this would be the Livestock Development Project where a farmer with the "additional" cash, could purchase some native does, become a recipient of a ZDSDP buck loan, establish pasture and ipil-ipil fences and begin his goat enterprise. While being profitable in its own right, it could fit into the farming system by acting as a bank with a source of readily liquifiable assets for future input purchases or emergency expenditures. However, the case study data has shown that the increase in income for the MCPP cooperators has prompted an equivalent if not greater increase in expenditures with the only reinvestment being an increase or change in the input levels of crops on other fields of the farm. To date the farming systems approach has not been present as a major thrust and the majority of the programmes work in isolation.

EXTENDED IMPACT

So far only a small percentage of farmers in the Province have been involved with ZDSDP agricultural programmes. Therefore, the social impact from the agricultural programmes has been minimal. The major social and economic impact at the Provincial level has come from the infrastructure programme. The social and economic impact at the Provincial level is discussed in Chapter 31 "The Importance of Roads."

FUTURE PLANS

While the Team was concerned with monitoring specific agricultural programmes in isolation, little or no continual monitoring and evaluation was being done at the overall Project, Programme, or Provincial level. A Monitoring and Evaluation Section has now been established with the Provincial Government. It is hoped that the activities of the agricultural Monitoring Team will be expanded to cover all of the agricultural programmes while the Provincial Section will monitor and evaluate the effectiveness and socio-economic impact of programmes at the Provincial level. The section should assist in the planning and implementation of programmes within the Province and then monitor and evaluate their progress. What is required is a type of sociological survey carried out on a regular basis with the results being fed quickly and directly to the Provincial Development Council and the Provincial Agricultural Council.

The lack of well trained and experienced persons to staff these monitoring and evaluation sections is a very serious problem. It is also very difficult to find short term training courses being offered in survey techniques, sample design and analysis. The Agricultural Monitoring Team learned by experience with new staff receiving instruction while on the job. In future it will be necessary to train these staff more fully at the local/project level with Project training courses while trying to find suitable courses elsewhere or develop these courses in association with other learning institutions.

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THE IMPORTANCE OF ROADS

B. Trevor Ole - Agricultural Economist

INTRODUCTION

In an evaluation by Nelson (1973) of twenty four development projects involving small farmers in a number of countries in South America, it was considered that roads were perhaps the single most important element in the pioneering, consolidation and growth stages of all projects.

The study comments that insufficient systematic thought is given to the standard or stage of construction of penetration roads, or to whom the benefits of lowered vehicle operating cost would accrue. Neither is sufficient thought given to the relationship between feeder roads and the penetration road in efforts to concentrate development and achieve higher employment, production and improved benefit cost ratios from the total development investment.

In all development projects, there is a need to consider the overall road investment against the potential development income from the area. Quite often this income will not derive unless significant investments are made in other areas such as agriculture.

There can be no doubt that market imperfections diminish considerably in developmental areas as access is improved through road construction. This is the result, not only of increased competition among buyers but also the greatly increased choice of markets available to the producer.

While the foregoing relate to economic benefits, the social benefits from roads are equally significant. Increased mobility facilitating delivery of services and giving a freedom of access to a variety of opportunities is an essential requirement of any society.

PROJECT ROADS.

The Zamboanga del Sur Development Project began as a road construction project. Agriculture assumed a minor role in Phase 1 (1974-1980). In Phase 2 (1981-1985) agricultural and social development programmes have become a major component.

This is consistent with the concept of integrated rural development which proposes that a range of programmes which complement the road system will accelerate rural progress and lead to balanced development. Thus, the lag between completion of the road and the arrival of goods and services is shortened as programmes for rural development are actively brought to the farmer with access to the road.

ZDSDP has pursued this course and through Phase 2 roads have meant such benefits as new livestock and agricultural programmes, water supplies, health, nutrition and electricity.

ROAD BENEFITS PREDICTED DURING PROJECT DESIGN.

In the 1975 Project Identification and Evaluation Study, a programme to construct 357 kms of road throughout the Province was proposed. Of these roadworks:

- 128 kms were to be constructed at tertiary or feeder road standard.
- 154 kms were to be constructed at quaternary or barangay access road standard.
- 75 kms were to be constructed at low traffic or service road standard.

The total proposed construction programme comprising this road network, a major irrigation scheme and one minor irrigation rehabilitation scheme had an internal rate of return of 27%.

It was estimated that 43% of the total benefits would accrue from transport benefits, 44% from agriculture and the remaining 13% from maintenance saved on upgraded roads.

The agricultural benefits were estimated on a with and without Project basis with Project input confined to the extension/training area.

CRITICISMS OF PROJECT ROADS.

Roads are a means of communication. Criticism of roads centres on physical, environmental, social or economic influences but never on the basic purpose of the facility. Roads are criticized for their quality of construction which determines the level of service provided reflecting travel cost, time and safety. Roads are criticized for inappropriate location, for adverse environmental impact, for displacement of means of livelihood, or other social disruptions. Roads are criticized for adverse economic changes but these are invariably minor in nature and are rapidly overtaken by an overall increase in economic and social development of an area.

The usual question posed by critics of the Project is "who are the beneficiaries of the Project, especially of the roads?"

A belief held by dissident groups and still expressed by some residents of the Province is that the roads were built to gain access to mining areas which would be exploited by the Australians with little benefit going to the people of the Province. While the truth is that the GOA signed over every item of machinery on its arrival and that even the work centre is on Provincial Government land, this belief prevails. It is quite possible that the people are so accustomed to exploitation following a history of occupation by Spaniards, Americans and Japanese that the concept of foreign aid is difficult to accept.

Another criticism is that the roads are built to assist the military in oppression of the people. While the history of the military involvement in the Province has been laced with incidents of oppression, they are present primarily as a peace keeping force. Problems arise when soldiers are located for extended periods in remote areas. They are often without funds and have no duties. The village must support their presence. With the arrival of a road the problem evaporates. Military requirements are satisfied by routine visits. Thus roads may ease rather than exacerbate any local problem with the military.

It has also been stated that only the rich, i.e. the traders, businessmen and middlemen with trucks benefit from roads. In the Institute of Philippine Culture (IPC) Sociological Survey of the Province (1982), respondents were asked to list the greatest problems and needs of their barangays. The most common responses were:

- roads, 24%
- lack of facilities, 25% and
- water supply, 25%.

While it may be true that higher income groups may benefit most, it is recognised by the barangay people that they will also benefit from road access. Whether it is in terms of access to health and education facilities, an outlet for their produce or opportunity for off-farm work, access gives these people the opportunity to do things and receive services which would otherwise be out of reach.

Another point of controversy is the question of who actually travels on the roads. A superficial road impact study made by a representative of Community Aid Abroad concluded that very few farmers actually travelled on the roads. However, the IPC Sociological Survey (1982) reported that there was an increase of more than two fold between 1976 and 1982 in the number of persons travelling away from the barangay to visit other places. For example, in 1976, only eight percent of respondents had travelled to Pagadian during the year whereas in 1981, 52% of respondents had made the journey at least once.

Farmers at subsistence level may initially have little use for a road. Such farmers seem to have little produce for sale and no money for travel. Nevertheless, farmers have nominated access as their primary problem and the IPC Survey evidence shows they are using the new roads. They know what the critics will not accept, that opportunities will arise because of the road. There will be programmes offered to improve their income, health and educational facilities for their children. They then have the choice of availing of any of these programmes which may be suited to their particular needs.

There is always a lag between completion of the road and the provision of services but the farmer knows he now has a link with the outside world. The development process for the farmer and his neighbours in the barrio has just begun.

TRANSPORT BENEFITS

There are four basic elements in estimating the benefits to road users:

(A) Upgraded roads.

1. Savings in distance related operating costs.
2. Savings in time related costs.

(B) Construction of new roads,

1. Savings from diverting traffic from a more expensive mode to a cheaper one e.g. pump boats to vehicles.
2. Savings in journey from farm to nearest road.

In the 1975 Project Identification and Evaluation Study, the benefits were based on projected traffic levels. Traffic counts were done in 1982 and compared with the projected 1985 levels.

Analysis showed that while actual traffic levels in the Baganian, Sibuguey and Western Districts approximated the projected levels, those in the Pagadian and Northern Districts were well below those projected. The relative newness of the total Northern road system may help to explain the overestimation in that area but other problems also exist.

One problem stemmed from the fact that the new highway bypass to the north was shorter and was meant to replace the old National Highway. However, a very steep incline on the new road made the route difficult and dangerous for many of the old and heavily laden vehicles. Moreover, the old highway covered established population centres which were not served by the new road. At present, the traffic volume on the new road is increasing and every second passenger bus trip goes via the new road.

Failing to give due consideration to existing population centres is a problem with several ZDSDP roads. In this Province, the shortest, most direct route or population centre bypasses are not necessarily the most effective transport systems. The approach has now changed. The location of population centres and total number of persons in the influence area are now integral parts of the road planning study.

A summary of transport costs on newly constructed or upgraded ZDSDP roads in the Baganian District is given in Table 1. In the eight years from 1975 to 1983 there has been no substantial overall increase in costs for both passenger fares and produce transport costs. However, the 53% increase in product transport costs from 1979 to 1983 is disturbing. If the rate of increase continues, it could have an adverse effect on the production and disposal of surplus grain in the Province.

TABLE 1

Transportation Costs

- Produce and Passenger Fares in 1975, 1979 and 1983

Pagadian to	Distance km	Passenger Fares ₱/Person			Produce Transport Cost (₱/kg)		
		1975	1979	1983	1975	1979	1983
Dumalinao	11 (11)	1.00	1.00	1.50	.02	.02	.05
San Miguel	33 (37)	3.50	3.50	5.00	.07	.04	.07
San Pablo*	44	2.00	5.00	5.00	.06	.05	.07
Dinas	40 (48)	4.00	4.00	5.00	.08	.05	.07
Danan*	56	9.00	7.00	8.00	.11	.08	.10
Margosatubig*	51	11.00	6.00	7.00	.16	.06	.10

* In 1975 there was no road connection to Pagadian and fares are for pump boat travel.

- Distances in brackets are those on existing roads in 1975.

AGRICULTURAL BENEFITS

The factors relating to increased agricultural production in response to road access are (1) crop area and
(2) crop yield.

The 1975 Project Identification and Evaluation Study based its projections on increases in areas and yields of rice (lowland and upland), corn, rubber and coconuts. These increases were proposed in response to particular road networks and assumed the involvement of the Ministry of Agriculture with its various programmes. At that stage there was no projection of ZDSDP-assisted agricultural programmes except for a small input into extension.

The following table shows, by location, significant changes in rice and corn areas per farm and yields per hectare for the period 1976 to 1981. Overall, the areas and yield increases predicted in the Study do not appear to have been fulfilled, especially the prediction of corn yield increases. The limited coverage of the ZDSDP agricultural programmes and implementation problems with the National Commodity programmes are reasons for this. Nevertheless, with several years of adaptive research and production experience now behind the programme it can be said that the yield increases predicted for corn were unrealistic.

TABLE 2

Changes in Crop Area and Yields by District

- Zamboanga del Sur
- 1976 to 1981

District	Rice Area	Rice Yield	Corn Area	Corn Yield	Coconut Area
Pagadian	NS	NS	NS	*(-)	NS
Baganian	*(+)	*(+)	*(+)	NS	*(+)
Salug	NS	*(+)	NS	NS	NS
Sibuguey	NS	*(-)	*(+)	NS	NS

NS Refers to no significant difference between 1976 and 1981 figures.

* Indicates a significant difference between 1976 and 1981 figures and the sign in parenthesis indicates increase or decrease.

Source: IPC Sociological Surveys (1977 and 1982).

Table 2 shows that the Baganian District has responded to both its increased road access and to the ZDSDP/Ministry of Agriculture/Philippine Coconut Authority programmes concentrated primarily in that area. In particular, the effect of the introduction of improved upland rice varieties through the Multiple Cropping Project can be seen. The Baganian is almost completely upland and is ideally suited to upland rice. The 1975 Project Identification and Evaluation Study predicted a decrease in upland rice area corresponding to increases in corn areas under the National Corn Programme.

The direct benefits accruing to farmers from road access approximate the savings in farm gate to feeder road (or market) transport costs. The present cost of transporting goods from the farm by horse or carabao is ₱0.02/kg/km. With the development of a corridor of feeder and barangay roads, this distance is reduced as is the total transport cost.

With improved road access there is competition between traders. Farmers can sell to the trader who offers the best price. Moreover, if the price drops to an unacceptable level farmers have the option to sell to the National Food Authority (NFA) with its grain support prices since the NFA also sets up buying stations along road networks.

ECONOMIC BENEFITS

The Institute of Philippine Culture (IPC) carried out Socio-economic Surveys of the Province in 1976 and 1981. A summarized table of income data comparisons by quartiles is given below (see Table 3). The study showed that incomes had increased significantly from 1976 to 1981 in all quartiles except the highest.

TABLE 3

A Comparison of Gross Household Incomes by Quartile Income Class in 1976 and 1981*

- Zamboanga del Sur

Quartile	1976			1981			Percentage Increase 76–81	Level of Significance
	Mean ₱	C.V. **	n	Mean	C.V. **	n		
Lowest	780	45	199	968	37	169	+33	.001
Second	1802	21	119	2267	20	169	+26	.001
Third	3459	22	119	4608	40	167	+33	.002
Highest	11846	119	119	12651	75	168	+ 7	N.S.

* 1981 figures are real incomes deflated to 1976 prices using the CPI for Philippines Region IX.

** CV - Coefficient of Variation, estimated from district figures.

Source: IPC Sociological Survey Data 1977 and 1982; additional data from IPC.

The absence of an increase in the highest quartile is surprising. Respondents in this quartile are businessmen and senior officials and enjoy income from a range of sources. It may well be that all sources were not tapped in the interviews since the expectation would be that the upper quartile would be the most likely to respond to opportunities to increase income.

The increase for the first three quartiles has not occurred as a result of increased farm productivity except perhaps in Baganian. Farm Case Studies research indicates that small farmers obtain a large portion of their income from off-farm activities. These activities have been made possible through improved road access which generates demand for services and goods which farmers can provide. It was also found that the more productive a farm is, relative to farms of similar size, the less time a farmer devotes to off-farm activities. Thus the means for a farmer to increase his on-farm production is being made available as new agricultural technologies are developed, proven and extended.

SOCIAL BENEFITS

The data on social benefits was obtained from the IPC Sociological Survey of the Province in 1981 and is included in the discussion below.

Social benefits can be expressed in terms of basic needs. There have been overall improvements in the following:

Group 1 (1) Housing structures in terms of the use of stronger materials.
(2) The level of nutrition expressed as a decrease in the number of malnourished children.
(3) The ownership of basic and additional furniture and other household items.

Group 2 (1) Water supply in terms of piped water to houses and wells and springs. Water supply still remains a problem in many of the rural barangays with 25% of respondents listing this as their greatest need.
(2) Basic health, measured by decreases in overall mortality and infant mortality.
(3) Education expressed as total enrolments and as the proportion of persons 10 years and above with fewer than four years schooling.
(4) Mobility expressed as number of visits outside the barangay.

In pre-road access studies carried out in the Province the first answers given to a question on perceived advantanges of having a road are
(i) better access to health and
(ii) education facilities.

There are significant social benefits implied in the economic benefits. The improved access has increased on-farm income and given farmers the opportunity to rise above subsistence levels of agriculture. Roads have attracted increased enterprise to barangays offering greater employment opportunities. Roads have also offered greater employment opportunity in neighbouring areas and have improved access to schools as shown by an increase in students and an increase in the willingness of teachers to attend schools in the interior. This increased willingness has also been noted in government officials of almost all agencies. The roads have brought about an improved distribution of government services and have greatly facilitated their delivery. In late 1981, electrification in Zamboanga del Sur was one and a half years ahead of its scheduled programme due to the construction of the Project roads.

These derived social benefits are important to the people but are in most cases non-quantifiable and do not add directly to farmers incomes. How do you quantify the statement "roads help to brighten a dull life". A special case is that of trying to value a basketball court constructed near the road when the road building equipment was operating in the area!!

THE PROBLEM OF ROAD MAINTENANCE.

The range of road choices for the Project were:

(i) Concrete (high capital cost, low maintenance, all weather).
(ii) Sealed.
(iii) Gravel to dirt (low capital cost, high maintenance, dry weather only).

Sealed roads were preferred to concrete due to the initial cost factor. It was decided that since access was the major priority and since concrete roads are approximately eight times the cost per unit length of sealed roads, it was better to link as many areas as possible within the financial constraint.

Because of this decision and because sealed and gravel roads require much higher levels of maintenance than do concrete roads, it was essential to upgrade the Provincial road maintenance operations.

Accordingly, the Project has devoted part of its resources to developing a road maintenance system within the Provincial Engineer's Office (PEO) using regular funds. To this end, ZDSDP has been promoting the IAD (Integrated Area Development) concept. IAD's are a regional concept; IAD's 4 to 7 of Region 9 are located in Zamboanga del Sur. An IAD is set up as a subdistrict of the Provincial Engineer's Office and maintenance and planning for construction is carried out at the IAD level by the PEO.

The performance of the PEO is monitored by the IAD Council consisting of Mayors, Municipal Development Officers and the President of the Association of Barangay Captains.

METHODOLOGY FOR PRIORITISING FUTURE ROADS.

In order to assist the Province in planning future road construction, a methodology was developed which enables potential roads to be prioritised. The terms of reference stated that the methodology must be:

(i) Compatible with Ministry of Public Works and Highways and World Bank methodologies.
(ii) Relatively easy for the Provincial Development staff to use.
(iii) Acceptable to other Provincial agencies.

The parameters considered for new road projects were:

(1) Increase per capita value of Agricultural Production over a 10 year period (Ag).
(2) Size of area served by road- Road Influence Area (RIA).
(3) Existing Population to be served by road (P).
(4) Project Cost (PC).

Where the proposal was to upgrade an existing road, a traffic volume parameter was devised to replace the road influence area parameter. Each parameter was given a rating point between one and ten based on a calculated value.

These rating points were used in the New Road Project Ranking Formula:

$$\text{Ranking No.} = \frac{(4 \times Ag + 3 \times RIA + 3 \times P)}{PC}$$

A higher weighting was given to agricultural potential because of the almost complete dependence of the population on agriculture. In hindsight, perhaps more emphasis could have been given to the population parameter to satisfy the view which favours having population centres served by roads.

It has been shown that this methodology can be used to provide a sound basis for planning. Nevertheless, Provincial officials and Regional Directors may still bypass the planning system and select projects according to their own criteria or preferences. If they do so, the entire planning process is wasted. Total acceptance of the system has not been achieved and the goal of prioritisation using unbiased criteria must be vigorously pursued.

METHODOLOGY FOR EVALUATING ROAD BENEFITS.

In 1982 it became evident that in order to study project impact ZDSDP needed more detailed information on what actually happened when a previously isolated barangay was linked to a main road network. Information was needed on who benefited, in what ways they benefited and by how much. It was decided to formalise this process using more detailed questionnaires and make each project a case study of before and after road access. It is proposed that the questionnaires be updated at six month intervals. Thus post road access studies will continue on for an unspecified period.

The present study of road impact requires the preparation of a barangay profile as a first step. Data on population, facilities, land use, crop yields, services and prices are collected.

Both quantitative and qualitative data are required to complete the profile. Thus, hard data on income changes is collected along with less rigorous information on change in quality of life. Other data is collected for long term planners seeking information on how to further utilise the road in the future.

A technique which uses changes in ownership of consumer durables and changes in housing and food consumption patterns as wealth indicators is being used to supplement the more pragmatic but difficult to collect income data. Off-road barangays are sampled to provide control data.

This study is in its early stages but it is planned to provide solid information on impact of roads by the end of 1985.

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EXTENSION IN ZDSDP AGRICULTURAL PROGRAMMES

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INTRODUCTION

The iterative development model presented by Aberdeen in Chapter 5 proposes that extension follows upon technology generation and on-farm testing.

The different ZDSDP programmes have varied greatly in the amount of technology generation and the amount of testing deemed necessary. The recurring theme is in extension where a major emphasis has been placed on technician training and in the use of incentives to accelerate the adoption process.

The following paper describes the rationale behind the extension programmes in:

The multiple cropping programme.

The tree crops programme and

the livestock programme.

The extension programmes take traditional concepts of extension into account but in providing major inputs, credit and other incentives the extension programmes have given a powerful impetus to the adoption process. There are lessons in the ZDSDP experience so far and there will be even more interesting outcomes in the future.

THE MULTIPLE CROPPING PRODUCTION PROGRAMME (MCPP)

Multiple cropping is the most complex and most demanding of the programmes. Six consultants are assigned to its various arms. Three separate but related extension programmes operate under the MCPP umbrella.

When the programme began it was generally agreed that the major constraint to farmers adopting high technology in annual cropping was funding. This may on the surface appear to be a very Western decision but it was at least partly concluded on the basis of the Ministry of Agriculture's previous experience with the national corn and rice programmes Masaganang Maisan and Masagana 99.

With credit, farmers did join the programme. The extension system developed was a Training and Visit (T and V) approach similar to that used in other national programmes. Trained technicians took responsibility for a group of farmer clients and nursed them through the whole process from planning to loan repayment. In common with all programmes, considerable emphasis was placed on training the supervisors. IRRI short course training has been provided and supervisors have had good access as subject matter specialists to their area-based technicians. So the programme has a sound organisational base.

Despite this results are variable. While it is no doubt true that not all technicians perform at a high standard, it is also unquestionably true that some farmers do not follow recommendations simply because the level of technology is too high. For example, corn farmers are known to disperse fertiliser intended for the 0.5 ha. funded area, over the whole farm.

In late 1981 it became clear that widespread adoption of the high input technologies developed for the credit programme was not going to occur. It was decided to peg the technology back to a lower level. A lo-input technology would have wider appeal and a better chance of having farmers follow directions.

THE NEW PROGRAMME

Research began on lower input methods and the idea of a Multiple Cropping Extension Programme was evolved. In the MCEP an attempt would be made to reach the majority of upland farmers through offering both the "hi-tec" and the "lo-tec" cropping technologies as alternatives.

"Hi-tec"

In the "hi-tec" extension programme a "non-package" approach was proposed. In this approach the package would be disassembled and each part of the programme would be extended at an appropriate time in a mass media information programme. In practice the credit supervisors actually do this through radio and specifically for credit clients. There is little evidence of adoption of more costly input aspects of MCPP technology outside the MCPP, which suggests that adoption of whole packages needs the backup of credit and technical advice. ZDSDP experience supports the experience of others which is that mass communications stimulate a requirement for further information. Thus a diffusion of innovation via the media is unlikely to result in adoption though obviously the media will be instrumental in creating interest in and awareness of the technology.

"Lo-tec"

The "lo-tec" programme is directed at erosion control. Erosion is the greatest cause of fertility loss in the Province and the greatest threat to long term agriculture. The cropping system devised involves growing low input cropping patterns between rows of densely planted ipil-ipil. The hedge rows control wash and at the same time are a source of nitrogen through cutting and mulching.

The "lo-tec" extension programme is based on the adoption process defined as a progression through - awareness, interest, evaluation and trial, to adoption. The mass communications programme described above presents information pertaining to the first two steps. Evaluation is achieved through widely dispersed demonstration plots all under the supervision of technicians with special responsibilities to the alley cropping system. If the evaluation impresses the farmer he will first take a tentative step and try it out before fully adopting it.

For the evaluation to be effective the demonstration must be located on a farm which other farmers consider representative of their own situations. If the cooperator is considered influential in an adoption group, he will possess similar attitudes to those farmers and they will identify with him.

The "lo-tec" programme is currently delivering the mass communications messages and establishing the demonstrations. When the extension officer feels that a significant group exists who wish to know more about the system, the demonstration will be the focal point of group discussion. In their own time the group will develop an attitude and a norm of behaviour about the alley cropping system. As a group they will acquire the confidence to adopt.

Finding an Appropriate Level of Technology

The hi-tec programme is credit based. The lo-tec is extension based. Neither is static. It is expected that the lo-tec crop rotations will be backed with credit by 1985. On the other hand, modification of the hi-tec cropping patterns by component analysis is refining the package so that it is becoming cheaper.

A series of experiments is analysing the components of recommended practices to determine their individual contribution to yield. Thus investigations on such aspects as planting time and configuration or weed control practices can become low cost recommendations which increase yield. Recent studies into the use of fertilizers on peanuts have shown that responses are minimal and unlikely to be economic on any but the poorest cropping soils. Local varieties and practices are also examined and compared with the new in the following way:

Farmer Variety x Farmer Practices

Farmer Variety x Recommended Practices

Recommended Variety x Farmer Practices

Recommended Variety x Recommended Practices.

The outcome of this work is intended to lead to a set of recommendations more suited to farmer situations. The level of technology will be more consistent with farmer resources and attitudes.

The project is therefore pursuing two paths to home in on the best bet level - that level of increased production which operates at risk, labour and indebtedness levels acceptable to the farmer. It may be arrived at by considering the optimum inputs through traditional research and then analytically withdrawing from that stance certain high cost inputs and replacing them with lower cost managerial inputs. Indeed present hi-tec recommendations fall substantially short of economically optimising input levels.

In the second approach, lo-tec starts with a cropping system. Optimisation is never a goal. The goals are a percentage improvement in yield, no change in risk level, savings in inputs and labour, and control of erosion. The outcome of the crop component investigations which actually prioritize managerial and cash inputs, are used in lo-tec. Lo-tec is however, a systems approach whereas hi-tec is crop specific.

Incentives and Packages of Technology

The future of this programme is to modify the extension approach with respect to "lo-tec". So far the "hi-tec" programme has achieved adoption of a package of technology through a credit incentive. Drop outs from the credit scheme selectively retain certain components of the package. The effect of credit has been to apply pressure to farmers to use all the components non-selectively.

Thus far the "lo-tec" promotion has been straight extension work. One would expect a piecemeal approach to adoption of the components of this package. It is proposed to include "lo-tec" in the credit programme to accelerate adoption through incentives and complete the adoption of the package. The assumption is that what may be achieved slowly by extension will be achieved more rapidly through the application of the credit incentive.

The logistic problems of supervising, funding and supplying inputs for the lo-tec programme will make it much more difficult to implement. Farmers will have to be commited to a crop rotation and borrow to fund the whole pattern.

THE AGRICULTURAL ENGINEERING PROGRAMME

This programme is primarily one of assisting farmers to reduce the time and ardousness of weed control using labour saving hand tools and cultivators. It has been particularly applicable to MCEP where detailed information on timeliness of weed control is available.

While in practice the programme implementors have to draw a delicate balance between stimulating demand and creating supply through local manufacture the concept is straightforward in extension terms. The idea is to use the credit programme to provide a means for farmers to evaluate the usefulness of the tools to their own situations.

Having established the usefulness of the tools in the minds of the farmers it is necessary to then supply the demand. A programme of assistance to local blacksmiths through training and designing and producing templates and jigs is an important adjunct.

TREE CROPS

The Tree Crops Programme (TCP) is typical of ZDSDP extension. The training and extension programme is augmented by the dispersal of improved types as an incentive.

The system has been to provide learning situations for interested farmers through rolling seminars. After these events the plants are dispersed. Follow-up is available from technicians located in the area. Demonstration farms growing coffee, cocoa and rubber are widely dispersed and these farms are intended to give the lead in a locality.

A great deal of effort has gone into producing a team of highly competent technicians in tree crops which has included training in Malaysia and Thailand for rubber technicians.

The introduction of coffee, cocoa and rubber was thought to be trouble-free. These crops are considered adapted across a range of environments. Thus there was a strong temptation to skip the traditional steps of crop development. In this case, the three crops were already growing in the Province.

With tree crops extension the farmer must, to some extent, act on faith. The demonstrations which should be his means of evaluating the relevance of the programme to his own situation are far too young to satisfactorily provide that service. Indeed, the ZDSDP demonstrations were serving the dual purpose of technology proving and demonstration for evaluation. Had the technology proving aspects been adequately tested first then it is certain that the cocoa programme would have taken a different form. It is a built-in problem with tree crops that proper evaluation takes many years. The introduction of a new technology, particularly high technology, without evaluation is risky. One might well conclude that there should never be an implementation programme until such time as the adaptive research is completed.

ZDSDP yielded to the pressure of immediate implementation. We now find that a rubber programme is not possible because there is no example of a successful smallholder rubber industry in the world to guide major funding bodies. The replanting programme in Thailand is different. It is conducted with experienced farmers on existing plantations. The cost of replanting one portion is supported by production from the other trees on the property.

With cocoa, the upper amazon hybrids have proved problematic to small farmers. They are High Yielding Varieties and inappropriate unless under sophisticated plantation management. Moreover, the Amazonians succumbed to Vascular Streak Dieback in 1982. Control may well only be possible on large, well-run plantations.

Thus the extension programme has foundered because with cocoa the technology was not first tested and with rubber because the committment of funding bodies was not first established.

The Coconut Lands Development Project is primarily an extension project in which 200 hours of training are provided to coconut growers over six months. The Philippine Coconut Authorities' coconut development officers from each area are responsible for training their own farmers in various aspects of coconut development and intercropping. Schemes run in association are, a carabao loan programme which is a revolving fund enabling farmers to purchase carabaos; a multiple cropping credit fund and a cacao fund. Research into annual cropping under coconuts is also conducted. Once again extension work is backed by incentives, technician training and provision of inputs to demonstration farms.

LIVESTOCK PROGRAMMES

The ruminant programme involves dispersal of male breeding stock to upgrade local goats and cattle by crossbreeding. A management input is essential to the success of this programme. There are two parts to the programme; the first involves locating bucks and bulls in strategic localities on loan. The second is a package of technology with goats which combines an improved breed, improved pasture and animal housing.

The cattle programme is quite simple in intent. It is to provide owners of native cows with the option of producing larger offspring for use as a draught alternative to buffalos. So far no attempt has been made to teach farmers how to use cattle for draught and very few cattle have been used for draught purposes.

With goats a more ambitious objective was defined. Two extension views were considered. The first was that technology packages are an inappropriate vehicle for extension and the second, that diffusion of innovation is encouraged by appropriate demonstrations. The objective is to introduce the whole package to farmers as an adjunct to cropping. Projected returns can be similar to those from cropping while at the same time the pasture phase will rejuvenate a portion of the farm.

The buck loan provides farmers with the opportunity of adopting the first part of the package. It recognises the view that that technology is adopted in a piecemeal fashion and a total package is arrived at in the course of time. This extension programme sets up a great many demonstrations of the package giving farmers the opportunity to evaluate the whole system while actually adopting portions of the technology, bit by bit. Nevertheless, bigger animals require more feed and just as fertilizers are essential to High Yielding Varieties, farmers will not fully capitalise on the system until they have adopted all components.

The native poultry upgrading programme is the main thrust of the monogastric sector which includes broiler, layer, pig and duck programmes. Again, improved animals are dispersed and the successful running of the improved animal calls for a major managerial input.

In this programme piecemeal adoption of the components of the package is a recipe for failure. Initial dispersals of improved cockerels showed that the introduction of a few into a village was ineffective. The dilution effect was overwhelming.

It was decided that the only possible method was to saturate a village with improved stock and follow up with a strong, technical support input. Accordingly, after an initial period of instruction which had a motivational component, improved cockerels were dispersed on condition that the natives were destroyed. Improved hens were dispersed in the same village but not to the same farmers who received cockerels.

A condition placed on a recipient was that he voluntarily disperse improved offspring from his crosses. The principle underlying this system is involvement. Mutual problems are discussed. Group sanctions apply to recalcitrant members. Each participant contributes to a generally supportive environment.

Initial indications are that the system is working. Voluntary dispersal of offspring has occurred. The final outcome remains to be seen but there is reason for cautious optimism.

The fisheries programme employs a modified T and V system. Technicians are located at hatcheries and are responsible to producers on a face-to-face basis. Group training programmes are conducted at live-in schools from time to time.

CONCLUSION

Experience with ZDSDP extension so far has proven the wisdom of Aberdeen's model for developing better farming systems. Where steps have been left out the experience has been chastening. Nevertheless, development programmes are under great pressure to produce quantitative results and the ZDSDP programmes provide an interesting case study where the pace of development has been accelerated using incentives and packaged technology. The final outcome remains to be seen.

TRAINING FOR AGRICULTURE

Robert J. Cogger - Reseach Agronomist

In this paper training will refer to staff development and technical training of line agency personnel and work experience training for University students. Farmer training courses and exercises are considered to be extension activities and are covered in earlier Chapters.

TECHNICAL TRAINING AND STAFF DEVELOPMENT

The Zamboanga del Sur Development Project (ZDSDP) has targeted all counterpart staff including supervisors and action officers for training.

Many of the counterpart staff have recently graduated from Colleges of Agriculture. A survey of the courses offered in those institutes has shown that these graduates are inadequately prepared for their roles in the Project, particularly when it is realised that the Project has introduced to Zamboanga del Sur methods of crop and livestock production which are not discussed in these courses. In addition the graduates' technical knowledge may be lacking and there has been little development of problem solving abilities.

The line agencies provide some training for their new staff however, this is rarely directed towards developing technical expertise or problem solving abilities. Australian staff have been conscious of the need to encourage their counterparts to assume greater responsibility for the decision making and problem solving needed for the successful implementation of the various programmes and have attempted to develop these abilities through informal interactions and meetings. At the same time they have designed training programmes to impart the technical expertise required to implement these programmes.

The goal has been to establish a core of responsible and technically sound officers within the line agencies, in the hope that the programmes will be effectively continued on completion of ZDSDP.

Responsibilities

The people responsible for each project develop, implement and assess their own training programmes. This approach has been adopted because it is felt that they are the best qualified to determine what skills need to be developed.

It could be argued that a "Training Officer" (TO) was needed for the Agriculture Project, since an expert in training or agricultural education would be better able to facilitate effective technician training. This approach was not adopted for two reasons.

(i) The diverse and complex nature of the Agriculture Project is such that the TO would need to rely on the technical experts. These experts would in any case be called upon to present formal training courses.

(ii) Many of the Australian staff assigned to the Project have had experience in training, adult education or extension. For example as at June 1983 of the eleven staff assigned to the Project, two have had experience as lecturers and administrators of agricultural colleges, two had experience in teaching, one had post graduate qualifications in adult education, whilst two others had post graduate training and experience in extension and extension methodologies. Some staff also have post graduate degrees or diplomas in education. With this pool of technical and training expertise available on Project it was felt that a full time training officer would be superfluous to the Project's needs. One member of the team was however, assigned to liaise with institutions to facilitate participation in courses offered.

Types of Training

The format or type of training adopted varies between projects, however, in general the following approaches are adopted.

(i) In service, on the job, training.
(ii) Seminars and short training courses within Zamboanga del Sur.
(iii) Training courses and conferences at other Institutions within the Philippines.
(iv) Courses and Study Tours in other countries.

(i) Senior staff carry out supervisory visits to assist the technician in problem solving and to give technical advice or guidance. This form of "supervisor guidance" is common to all projects, however, it has been most strongly developed in the MCP. Supervisors visit each area once a week. This ensures that all technicians are visited regularly and are able to discuss their problems. Constant supervision and guidance of MCRP staff is offered by senior personnel, and is closely linked to weekly team meetings at which problems and programmes are discussed.

(ii) Formal seminars and training courses have been offered in all projects. These courses are usually organised around a particular subject as in the Tree Crops Rubber Training Course or for a particular purpose such as the MCPP Pre-Cropping training courses.

During the early stages of the Project lectures were presented by the Australian consultants, however, as supervisors became more versed in the technologies they took over more of the responsibilities for organisation and presentation of the courses. These courses are generally offered to all technicians involved in a particular area of activity e.g. courses for all livestock technicians. Scientists from other institutions and short term consultants have also presented lectures at specially arranged training seminars or field days.

(iii) The Project has tended to rely on training courses offered by national and international institutions located within the Philippines. Although technical courses offered by IRRI and UPLB may be expensive they offer the opportunity to develop a core of technical expertise within the various agencies in the Province. They also enable staff to make useful future contacts with leading researchers and academics in their field.

Staff assigned to the MCP have attended various courses at IRRI including the Cropping Systems Training Course. Livestock Officers have attended summer schools at UPLB and have also gained valuable experience working on commercial livestock farms in Cebu.

Agroforestry and Sloping Land Agriculturalists have visited the Mindanao Baptist Rural Life Centre at Bansalan, Davao del Sur to study Sloping Agricultural Land Technology and various livestock officers have also participated in training courses at that centre.

It is proposed that MCP research staff be sponsored to undertake Masters training at the UPLB. Discussions are being held to develop an agreement between MA/ZDSDP and UPLB in order to facilitate this kind of training, which is considered essential for the continuance of the Research Programme. Because there is only one qualified veterinarian in ZdS one member of the Monogastric team is being sponsored to do the Veterinary Medical Course at U.P. Diliman.

A number of staff have attended national and international conferences and presented papers. Attendance at conferences is supported since it is a way to facilitate linkages between project staff and scientists working in other parts of the Philippines.

(iv) The Project feels that in general the Philippine Universities and Institutes offer training that is relevant to counterpart staff. However, in some cases there are insufficient training opportunities provided in particular subjects within the Philippines so it is necessary to seek those opportunities overseas.

Thus a number of staff have undertaken study tours in Thailand, India, Sri Lanka and Australia. An entomologist from Betinan Research Station completed 3 months training in methods of biological control at CSIRO, Division of Entomology, Australia and one student completed a Masters Degree at the University of Queensland.

Problems Encountered.

Although the various line agencies recognise the need for training, no line agency has a training section adequately equipped or staffed to undertake this training. Despite claims that funds would be made available specifically for training little has been provided. To date almost all Project training has been funded through Australian counterpart funds and has been carried out by the Project or Project assigned staff.

It is hoped that the technical knowledge and expertise at present being acquired by various supervisors within Project programmes will be used as a training resource when the Project terminates. However, this will require a financial commitment on behalf of Regional and National Offices, which to date has not been forthcoming. The National Manpower and Youth Council, on which the Project has been basing its overall training programme does not have the facilities, the manpower, nor the expertise to be able to undertake agriculture training programmes.

The relatively short duration of the Project and the desire to accelerate Provincial development has created problems for training. Project coordinators have the desire to sponsor a large number of personnel to undertake training at institutions. The numbers involved are well above national scholarship quotas assigned to the Province, thus normal line agency nomination procedures cannot be followed.

The Project has used its influence with various institutions and created special scholarships which have allowed a number of people to attend training courses to which they could not have otherwise been nominated. The total number of places available on training courses is limited and it is becoming more and more difficult to achieve the desired numbers. The situation is especially critical at IRRI where quotas are set on a "by country" basis, with only a limited number of places in each course being available to the Philippines. Although IRRI has cooperated as much as has been possible, some Project nominees have not been able to attend because all Philippine places have been assigned. No definite solution has been found to this problem, despite discussions and communications with IRRI, senior line agency staff and the Project Office.

A philosophical problem also exists. Many of the staff assigned by the line agencies, particularly the Ministry of Agriculture are not permanent employees, their contracts being co-terminus with the Project. The question arises should large sums of money be spent on training a large number of people who will probably not continue to be employed after the completion of the Project or should training be offered only to those officers who are permanent employees and who will continue in employment after the Project?

Assessing the Effects of the Training Programme.

The goal of the training programme is to improve the long term performance of the target group. The success or failure of training can therefore only be assessed after the recipient has returned to the site of employment and begins to apply what he/she has learnt.

An objective appraisal of the effects of Project training cannot be made since the agencies have no assessment system by which to compare the work performance of staff. However, a subjective comparison of the degree of technical expertise and enthusiasm exhibited by Project assigned staff, when compared with regular line agency personnel would indicate that Project training and staff development has had significant positive and beneficial effects. Whether this will continue beyond the Project phase is unknown.

UNIVERSITY STUDENT WORK EXPERIENCE TRAINING

Introduction

Students enrolled in University Agricultural courses are required to undertake work experience training to qualify for graduation. The Project has offered its assistance to Universities in order to give students the opportunity to work in the various projects. This also assists in the dissemination of technology developed in ZdS.

The Procedures

The Dean of the faculty must contact the Project at least three months before the expected date of commencement. The various officers involved then prepare a training programme for the nominees.

On arrival the participants are given a briefing on the Projects' aims and objectives, as well as it's achievements. The students are then assigned to their centre of work. The type of experience varies from project to project. It is generally of a practical nature, concentrating on the "how" rather than the "why". Lectures and seminars are also given in some of the centres such as Betinan and Bagalupa.

At the completion of training the students receive certification for having worked on the Project, and an assessment of their performance is forwarded to the Dean of the College.

The Output

To date eighty one (81) students from six (6) universities have undergone training in this programme. The areas in which training have been given include cropping research, tree crops husbandry, livestock husbandry, fisheries, agricultural engineering, and socio-economic monitoring. A number of final year students have been assigned to the Betinan Research Station and to the monitoring team in order to carry out the research needed for their final year thesis.

Feedback from the students and their universities, has shown that this programme has been beneficial to the students and their institutions, as well as enhancing the reputation of the Project in other parts of the Philippines.

THE ZDSDP TRAINING CENTRE

Henry Crocker - Training Advisor

INTRODUCTION

During Phase I of the ZDSDP from 1974-1980 training was essentially project oriented and accomplished on an ad-hoc basis. This continued into Phase II until 1982, following the needs of the project in the categories of agriculture, infrastructure, supervision and management.

Early in 1982 the National Youth and Manpower Council (NMYC) joined the project and began the establishment of a resource centre for training to be utilised by the cooperating agencies in the Project.

In 1983 a comprehensive training plan incorporating all project sectors including social development, was developed with NMYC. This plan identified groups to be trained, the training needs, suitable programs, resources for these programs and a system for the assessment and evaluation of the participants and the program. A logical framework matrix for the training program is shown in figure I.

OBJECTIVES

An important objective is the development of the National Manpower and Youth Council's management role in training to sustain coordination of development training for project and line agency personnel in Zamboanga del Sur through a training resource centre.

Cooperating line agencies are encouraged to identify, initiate and engage in a cost sharing approach to training. The pooling of financial resources is seen as an essential for success. Coordination and cooperation between line agencies will be enhanced through utilisation of the centre for composite training course groups.

Due to the shortage of skilled heavy equipment operators and maintenance personnel and their marketability in the middle east, high priority is given to the objective of the establishment of a Heavy Equipment Training Centre. The Project also offers work experience for students and trainees in all program sectors.

NATIONAL MANPOWER AND YOUTH COUNCIL

NMYC was identified in the Project Study Report of 1980 and the Institutionalization and Manpower Development Study, July 1982 as the appropriate agency to take the lead role for overall responsibility for training and coordination.

NMYC has a dual role in training namely:

(a) Assisting with the implementation of specific training programs for the project.

(b) Undertaking training programs as directed by their Regional Office under the normal NMYC charter.

The training program being co-ordinated by NMYC meets identified needs in the areas of vocational skills training and testing for instructor development. NMYC courses conform to nationally recognized accreditation standards.

NMYC accepts trainees from the ranks of the unemployed, the private sector and the line agencies, but has particular concern for unemployed adults, out-of-school youth and housewives, offering basic skills training in the disciplines of welding, automotive, electricity and domestic arts. Training consists of 80 percent practicum and emphasizes skills development. Additionally NMYC conduct skills upgrading programs which are designed to enhance existing knowledge and skills of the participant for optimum work capability and operational mobility.

The training infrastructure being established by NMYC in Pagadian City with Government of Australia assistance will contribute substantially in providing interested individuals, particularly the socio-economically disadvantaged members of the community, with marketable skills, thereby making them more competitive in the labour market.

PROJECT RELATED TRAINING

Infrastructure

Training needs for engineers are met in specialized technical areas and in basic management procedures. Technicians and operators are given training in basic job related fundamentals. The PADAP Workshop training embraces in-house and on-site programs in addition to skills up-grading for automotive mechanics and welders. Barangay training needs are in the areas of work planning and road maintenance techniques and basic skills.

NMYC trade testing and certification of personnel is of high priority.

Agriculture

Agricultural training is covered in more detail in a later chapter.

Training needs are generally in job-related technologies and in basic management procedures for supervisory staff. Technicians engaged in extension work receive training in communication and instructional technique. The agriculture component of the project coordinates an extensive and on-going work experience program for university students.

Management & Supervision

Programs are designed for people with similar job responsibilities and education levels. Groups have a mix of project and line agency staff so that the program activities create a 'team building attitude' while meeting job related training needs.

The project has identified need for training in basic supervision and management procedures for first and middle level personnel, job-related advanced technical training for planning and monitoring staff, and integrated development management training for top management personnel.

Whenever possible the management training program will be conducted by government agency training groups e.g., Civil Service Commission, National Economic and Development Authority, who are responsible for regional and national training education programs. This will ensure that content of the programs, in addition to meeting specific project/line agency needs, is compatable with national activities and provides participants with the opportunity of obtaining official training accreditation.

In the final development of the programs the training organizations will, with assistance from NMYC, conduct on-site needs surveys in order to select material and learning activities that are 'work-place' related.

Provincial and Municipal Planning & Development

This a growth area both in staff appointments and associated training. Considerable emphasis is being placed on training for staff in provincial and municipal planning, survey, design, evaluation and monitoring techniques.

The Training Centre

NMYC has the use of substantial project buildings providing administrative offices, classroom/conference rooms and workshops.

Renovation costs are shared between GOP and GOA. The centre is equipped with comprehensive audio-visual software and equipment. A technical library with in excess of 2000 references is staffed by a fulltime librarian. A satellite library is maintained at Betinan Research Station.

The heavy equipment training facility will be directed at producing qualified personnel in accordance with nationally recognized skills standards in the following skill categories:

- General Heavy Equipment Mechanic
- Component Rebuild Mechanic
- Underframe Mechanic
- Serviceman
- Welder

Course content will commence with a module of general shop practice which is basic to all five skill categories. The remainder of the course will comprise a further eight modules which are taken at Level I in some skill categories at Level II.

It is proposed that a further skill category of Heavy Equipment Operator Training be included. The initial thrust will be in the areas of skills upgrading, testing against known standards and certification of existing heavy equipment within the province. Supervisors within the heavy equipment construction industry will require exposure to heavy equipment operation and maintenance training. The long term intention is to provide a pool of competent heavy equipment operators for all local, regional, national and overseas needs.

TRAINING COMPONENT
LOGICAL FRAMEWORK MATRIX
ZDSDP II

GOALS HIERARCHY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	CAUSAL LINKAGE ASSUMPTIONS
PROGRAMME GOAL To raise the living standards of the majority of the population in Zamboanga del Sur. To generate a self sustaining development capability in the Province.	Changes in housing, nutrition, health, income, education, attitudes and their distribution across the population. Changes in the capacity and capability of responsible institutions.	Government social and economic surveys related to benchmarks. Surveys of responsible institutions related to benchmark surveys.	That line agencies will cooperate & that personnel need to be trained in order to effectively contribute to raise the living standards and to leave a self sustaining development and capability in the Province. That line agencies will provide permanent positions for contractual employees.
PROJECT PURPOSE Upgrade competencies of Project and line agency personnel at all levels. Promote coordination and cooperation between line agencies. Develop the capacity of NMYC to sustain coordination of development training for Project and line agency personnel in ZDS.	Production of competent artisans, supervisors and managers. Involvement of Project and line agency training coordinators. Production of a body competently training personnel within agencies. Contribution by NMYC in respect of preparation and competent execution of training programmes.	Post course evaluations. Trade skills testing. Civil Service Commission assessment. Off project academic institutions assessment. On the job performance appraisals. NMYC assessment-hands-on skills training. Effectiveness of training coordinators.	That NMYC is the appropriate body with the capacity to coordinate training activities. UP-CPA & CSC are appropriate to conduct management & supervisory training programmes. Implementation of professionally managed & structured training programmes will result in competent personnel in project & line agency job positions.
PROJECT OUTPUTS Hands-on training programmes. Supervisory & management training. Off project training programmes. Training of trainers. Integrated line agency training. Coordinated development of training for line agencies. Production of a training infrastructure capable of upgrading specific job related competencies for craftsmen, operators, technicians, supervisors and managers.	Structured training programmes. Number of graduates and trained personnel. NMYC personnel trained in training management. Completed facility.	Training schedules. Training activities summaries. Teachers attend upgrading courses. Reviews and evaluations. Reports.	That line agency training coordinators will promote coordination & cooperation between line agencies. That training is appropriate, effective and the time span allowed is sufficient. Line agencies will support training through participation and funding.
PROJECT INPUTS ZDSDP personnel. Line agency training coordinators. NMYC personnel. Australian advisory personnel. Facilities constructed. Equipment. G. O. P. Funding. G. O. A. Funding. Training Materials.	Provision of ancillary personnel. Provision of training coordinators. Qualified training staff. Provision of advisory personnel. Facilities operational. Equipment provided. Cost estimates. Presence of training component in line agency budgets. Appropriate training materials.	Staffing levels are adequate. Number of coordinators adequate. Sufficient teachers are provided. Facilities maintained and utilized by beneficiaries. Submission of budgets. Existence of training materials. Advisory personnel provided. Reports.	Competent personnel, training coordinators and qualified trainers are provided. Training facilities will be provided. Budgets arrive on time. Funding is commensurate with training needs. On-site Australian advisory service will be continued until Feb. 1985.

GOALS HIERARCHY	CAUSAL LINKAGE ASSUMPTIONS
PROGRAMME GOAL To raise the living standards of the majority of the population in Zamboanga del Sur. To generate a self sustaining development capability in the Province.	That line agencies will cooperate & that personnel need to be trained in order to effectively contribute to raise the living standards and to leave a self sustaining development and capability in the Province.
PROJECT PURPOSE Upgrade competencies of Project and line agency personnel at all levels. Promote coordination and cooperation between line agencies. Develop the capacity of NMYC to sustain coordination of development training for Project and line agency personnel in ZDS.	That line agencies will provide permanent positions for contractual employees. That NMYC is the appropriate body with the capacity to coordinate training activities. UP-CPA & CSC are appropriate to conduct management & supervisory training programmes. Implementation of professionally managed & structured training programmes will result in competent personnel in project & line agency job positions.
PROJECT OUTPUTS Hands-on training programmes. Supervisory & management training. Off project training programmes. Training of trainers. Integrated line agency training. Coordinated development of training for line agencies. Production of a training infrastructure capable of upgrading specific job related competencies for craftsmen, operators, technicians, supervisors and managers.	That line agency training coordinators will promote coordination & cooperation between line agencies. That training is appropriate, effective and the time span allowed is sufficient. Line agencies will support training through participation and funding.
PROJECT INPUTS ZDSDP personnel. Line agency training coordinators. NMYC personnel. Australian advisory personnel. Facilities constructed. Equipment. G. O. P. Funding. G. O. A. Funding. Training Materials.	Competent personnel, training coordinators and qualified trainers are provided. Training facilities will be provided. Budgets arrive on time. Funding is commensurate with training needs. On-site Australian advisory service will be continued until Feb. 1985.

CONCLUSION

The establishment of Training Resource Center will be a significant contribution to the development of Zamboanga del Sur, Region IX and to the national interests as a whole.

The training program envisaged are seen to be within the scope and resources of the participating agencies and in accord with institutionalization objectives of ZDSDP.

Export of manpower, principally to the Middle East is an important feature of the Philippine labour market scene. While financial benefits accrue, there nevertheless exists a "skill-drain" which embraces the building and construction industry.

DEVELOPMENT COMMUNICATION ON ZDSDP

Wayne J. K. Haslam - Executive Officer

INTRODUCTION

In the first phase of the Project from 1974 to 1980 a management office coordinated planning and implementation of programmes with little or no involvement of the beneficiaries and with limited participation of the provincial offices of the agencies. This was a "top down" approach and programmes were not readily accepted or adopted in some areas due to cynicism and suspicion of the Project aims. This was exacerbated by high technology and an over ambitious coverage of the Province. There was significant but isolated opposition to some aspects of the programmes thus presenting government opposition factions with grounds for criticism.

In its second phase beginning 1981, the Project faced the need to alter its approach and launched an active communication campaign to correct misconceptions and counter "disinformation".

The ZDSDP development communication programme began in the late 1981 with the aim of disseminating information concerning project activities and achievements. This was combined with a monitoring system using various sources for cross checking.

While the project management did evaluate derogatory or biased material, it made no attempt to directly counter specifics. Constructive criticism was always considered and directly answered.

OBJECTIVES

The objectives of the development communication programme are as follows:

1. To create awareness of what the Project is, what it is doing, its contribution and objectives.
2. To soften and/or correct antagonistic attitudes towards the Project and its staff by inviting criticism and redirecting project efforts to satisfy constructive criticism.
3. Identify methods and procedures whereby the development communication programme could be integrated with the management system.

These objectives conform to the overall requirements of the NACIAD for development communications in their IAD programmes.

THE PROJECT'S DEVELOPMENT COMMUNICATION PROGRAMME

Radio

The 1981 socio-economic survey of the Province by the Institute of Philippine Culture (IPC) showed that more than 81% of those surveyed were regular listeners to radio. This was an increase of more than 20% over the 5 years from 1976. Radio was therefore considered the most effective method of reaching the largest number of people in the Province.

The Project implemented the following series of programmes in the vernacular at key listening times to suit the daily activities of the rural population.

a) A daily 15 minute newscast about project developments.
b) A daily 15 minute soap-opera with interaction between the programme and the rural populace.
c) A weekly quiz/variety show.
d) A weekly commentary on project activities.
e) A weekly programme of Australian popular music with information about Australia and the Project.

Television

Because there are relatively few sets in the Province and considering the profile of ownership, little use was made of television. A shortage of resources also limited its effectiveness. However, television was used to convey information to the business and professional urban population at provincial, regional and national levels.

Newspaper and Magazines

Very low distribution figures and the cost prevented effective coverage of the target population. The weekly Pagadian City newspaper has a circulation of only 1500 copies within the Province.

Project Briefing Material

The project office has continually upgraded the audio/visual programme of the Project together with printed materials on all aspects of the programmes for general distribution and to brief visitors to the Project.

Field and Open Days

Field and open days were staged for all aspects of project programmes. Target groups included school children, students, farmers, professionals, skilled workers and interested groups in the government, commercial and private sector.

Speaking Engagements and Group Membership

Project management actively encouraged its personnel to accept invitations to address meetings, conferences or any gathering at all. The Project also encouraged its staff to join local service groups to convey project information at a personal level.

Agro-Industrial Fairs

An agro-industrial fair combined with barangay or poblacion fiestas provided a vehicle for extensive dissemination of information while at the same time enhancing the fiesta. The fairs provided the opportunity for all sectors of the community, government and non-government, to display aspects of their activities and promote their particular aims. It provided the community with the opportunity to see displays at first hand and ask questions in an informal and friendly atmosphere. Very few of the rural poor would otherwise have the opportunity or the incentive to pursue an interest in a particular agency programme.

Barangay Notice Boards

As part of its Community Development Worker programme, the project distributed posters explaining various aspects of programmes together with dual purpose notice boards/blackboards in barangay halls.

Comics

Comics are perhaps the most popular and widely read medium of communication in the country. Some 3 million copies are produced per week. Comics are read and reread and handed to other members of the family and friends. They can be produced locally for less than 2 pesos per copy. Comics have been used to support extension activities in a number of the agricultural programmes.

Peoples' Theatre

Preliminary work with peoples' theatre showed promise. The considerable skill required in directing the production was not available at provincial level. Role playing, a variation of this, was successfully used by the community development workers and agricultural extension staff to acquaint barangay people with methods of problem solving and seeking information and assistance from agencies.

The Information Caravan

The van moves from barangay to barangay for 3 day sessions, displaying programme posters and exhibits of various programme inputs and outputs. This is complemented with such things as singing, talent contests and movie films interspersed with project information. The first two days are spent disseminating information, inviting responses and entertaining. The last day is a forum involving representatives of agency programmes identified in the first two days as being of most interest to the barangay.

The caravan is approximately 2.5 metres wide and 7 metres long. It is mounted on centrally placed double axles with two large doors opening on one side to provide display areas and a stage for presentation.

ACHIEVEMENTS

The development communication programme has resulted in a vastly improved understanding of the project objectives and achievements. In objectively answering its critics staff have developed a people-sensitive approach. This was absent in the first phase of the Project. Subsequent criticism at provincial level was constructive and critics outside the Province only referred to specific issues and not to the whole Project. A number of significant modifications have been made as a result of constructive criticism.

Radio coverage was the basis of the success of the information programme. From a survey covering approximately one third of the area of project influence, it was found that of total listeners, a little under 50% regularly heard the project broadcast. Newscasts attracted 77% of listeners, dramas and soap operas, 66% and commentaries, 53%. More than 60% considered they provided useful information about the Project. Respondent requests for additional information were as follows:

Component	% of respondents
Agriculture	42%
Rural Water Supply	33%

Roads and Bridges	29%
Freshwater Fisheries	22%
Irrigation	19%
Social Services	15%

59% of listeners were farmers.

The activities of the caravan had a significant impact in barangays due to its highly visible and entertaining format. The caravan commenced operations in August 1972 and by November 1983 had covered 83 barangays and 23 poblacions.

INSTITUTIONAL LINKS

The development communication programme was to be operated by the information and publications division created under the Memorandum of Understading and signed by the two governments in 1981. In late 1981 NACIAD agreed to provide an information officer. With GOA funded staff and staff on detail from agencies and other divisions a very successful development communication programme was created. Regrettably, at the end of 1983 there was still no approval to fully staff the division and only 2 positions had been approved for information personnel under the administrative division of the Project Director's Office.

The communication programme should be structured to form an integral part of project management. As it disseminates and collects information it should feedback to management through the monitoring group.

The development communication programme formerly operated under the Project Director's Office, but could be institutionalised into the Provincial Development Staff of the Provincial Government. The recent revision of the Local Government Code puts the information office under the office of the Governor. Here it could become politically oriented and this would not be desirable. Under the Provincial Development Coordinator it could be a significant force in development through providing support to government and non-government agencies.

CONCLUSIONS

In Integrated Area Development projects a communication programme must be regarded as a contribution to management. It can assist in the establishment of policy, programming and monitoring and provide soundly based information for design.

ZDSDP Phase II has adopted the policy that acceptance and adoption of agency programmes will be best achieved with full involvement of beneficiaries. This is only possible if the beneficiaries are fully aware of the objectives of the Project. While the radio programmes succeeded in creating awareness, the caravan was effective in consolidating acceptance. The other communication techniques were more difficult to evaluate but they must certainly have contributed to a greater awareness of ZDSDP and its objectives.

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ROAD CONSTRUCTION AND MAINTENANCE

Douglas A. Eakins - Project Engineer

INTRODUCTION

The need for a comprehensive transportation network is recognised as a necessary but not sufficient condition for successful outcomes to integrated area development projects designed to improved the living standards of the population in a target area.

The Zamboanga del Sur Development Project (ZDSDP) has targeted tropical upland areas. A road network of some four hundred kilometers will have been completed over an eleven year period to project completion at the end of 1985. In addition, it is expected that road maintenance procedures and practices will have been established to preserve this network and enable the full potential of associated Project programs in rural water supply, agriculture and social development to be achieved.

This paper deals with the Project's experiences in road construction and maintenance in the period 1974 to 1983.

ROAD CONSTRUCTION

Zamboanga del Sur before ZDSDP

Prior to commencement of ZDSDP in 1974, the total estimated length of the provincial road network in trafficable condition was six hundred and seventy kilometers, of which about 50% was impassable in the wet season. This network serviced only some of the main towns or poblacions in the province and could, therefore, be considered an incomplete primary or trunk road network. It served a total population at that time of approximately 700,000 in an agriculturally useable area of 6,000 square kilometers.

Feasibility Studies

Following detailed feasibility studies conducted at the commencement of the Project, road networks involving new construction and reconstruction were identified by cost benefit analysis using the upland farmer as the target beneficiary. To achieve relatively quick, widespread impact, low cost roads using flexible pavements of naturally occuring gravels were used, surfaced with a bitumen seal where warranted by traffic volumes.

Standards and Specifications

Road and pavement design work was initially carried out in Australia and based on standards developed there. These standards continued to be used when the function was transfered to the Project office in Pagadian. With distribution of new standards by the Philippine's Ministry of Public Works and Highways, use of Australian standards is expected to be phased out as Australian involvement is progressively withdrawn, Bridge design and construction specifications conducted in-country used the normal standards of the Philippine's Ministry of Public Works and Highways (MPWH).

Road construction specifications have largely been based on Australian developed specifications. Again with recent publication by MPWH of new specifications based on American Association of State Highway and Transportation Officials (AASHTO) requirements, the use of Australian specifications is expected to be phased out.

Implementation Method

Road construction has been by administration using project equipment and workshop facilities purchased with Australian funds. Bridges have been constructed by contract.

During Phase I, (1974-80) construction was undertaken by an autonomous project office independent of regular government agencies in the Province. Australian counterpart engineers and supervisory staff exercised considerable control over construction operations.

In contrast, the approach in Phase II (1981-85) has been to transfer project construction functions to the Provincial Engineer's Office. Experienced Filipino counterpart staff have progressively assumed more authority with Australian fulfilling more of an advisory role.

This approach is in common with all Phase II Project programmes where the intention has been to gradually withdraw Australian involvement. On completion of the Project there should remain an ongoing capability in the Province. With the road programme, ZDSDP transferred construction functions from the Project Office to the Provincial Engineer's Office.

Early in the life of the Project when work concentrated of improving the primary and major secondary road networks, considerable use was made of scrapers. This has been reduced because of the less demanding earthworks of minor secondary and feeder barangay roads. For these works the fleet of Caterpillar D7 and D5 dozers has proved to be more efficient. Earthworks have been usually compacted with sheepsfoot rollers.

As mentioned previously, flexible pavements have been constructed throughout the life of the Project. Locally occurring gravel deposits have been used in some cases being mechanically mixed with other locally available materials to improvedtheir properties. Breakdown of oversize pavement materials has been achieved by tractor drawn grid rollers with compaction by vibrating and static, smooth drum rollers and rubber tyred rollers.

Results

As at the end of 1983 approximately 350 kms. of roads had been either constructed or reconstructed including about 100 km of bitumen sealed roads.

At the end of 1983 plans were well advanced to have the PEO undertake construction of roads using some project funds. When implemented, this will be a significant step toward ensuring the Province retains a construction capability after the Project finishes at the end of 1985.

ROAD MAINTENANCE

Maintenance Before Project Involvement

A maintenance program is a necessary extension to the road construction program to enable the full benefit of the integrated area approach to be achieved.

Prior to the project becoming involved in maintenance the capabilities of the responsible government agencies in the province were not well developed. In common with many countries, funds available for road maintenance were inadequate for poorly constructed roads were likely to be diverted to other uses.

Maintenance Responsibilities

In the Philippines, responsibility for road maintenance is divided as follows:

- For national highways (or primary roads), the Ministry of Public Works and Highways.
- For provincial roads (or secondary roads), the Provincial Engineer's Office
- For barangay (or feeder roads), the Municipal Mayor, using labour intensive methods or services available through the Provincial Engineer's Office.

Since the commencement of Phase II of the Project in 1981, Project personnel particularly Australian personnel, have become heavily involved in assisting the Provincial Engineer's Office, the agency responsible for maintaining most of the provincial road network. For this maintenance program, systems and procedures are being established to ensure that best use is made of maintenance funds provided from national and provincial resources on the basis of a fixed peso rate per kilometer. In addition, the Project has transferred equipment suited to maintenance to the PEO and Australian funds are being used to purchase some new equipment.

In the case of national road maintenance for which the Ministry of Public Works and Highways has responsibility, the Project has had little input.

Maintenance Procedures

The most significant procedure incroduced into the PEO has been splitting operations into four districts, and implementing a rental system for use of equipment together with stricter monitoring of operations.

The districts correspond to Integrated Areas of Development as defined the National Economic Development Authority. Each district office has been allocated a fixed amount of equipment to undertake maintenance of barangay roads. The same equipment can also be used to carry out construction works if funds are available. A small workshop is attached to each district office to undertake routine servicing and minor repairs of equipment.

Major repairs are carried out in the Provincial Engineer's Office base workshop in Pagadian which was previously the Project workshop. A large construction team is also based at Pagadian to be used on construction projects which are beyond the capacity of the district offices.

A detailed costing and accounts system is being introduced into the Provincial Engineer's Office, to properly control expenditure and monitor maintenance and construction activities. In contrast to previous practice, use of PEO equipment is now strictly subject to rental charge based on Ministry of Public Works and Highways Bureau of Equipment rates. The charges made are accumulated into an internal PEO equipment fund from which workshop operations, spare part and equipment replacement costs are met. Use of a fully costed system of operation is believed to be a major innovation at provincial government in the Philippines.

Results

Inspection of the Provincial road network in the period 1981 to 1983 has shown that considerable improvement maintenance practices has occurred where the district offices have been established. This is evidenced by road conditions remaining stable or improving rather than deteriorating. However, considerable input is still required to ensure a continuing capability when Project involvement ceases at the end of 1985.

CONCLUSION

The construction by the Project of an extensive provincial road network has enabled the Project's water supply, agriculture and social development programmmes to be extended widely through the Province of Zamboanga del Sur.

The good prospects for having this road network maintained in reasonable condition should ensure that the Project's other programs and provincial programs in general are not hindered by deteriorating quality of access.

THE RURAL WATER SUPPLY PROGRAM OF ZDSDP

R.J. Shorrock - Community Development Engineer

INTRODUCTION

The rural supply program of the ZDSDP was initiated in 1977 after observing and experiencing the hardship that so many of the population faced in obtaining potable water. The Australian government supplied an Atlas Copco Aquadrill and a drilling supervisor while the Philippine government agreed to supply labor and the materials to install handpumps. The drilling commenced in 1978, and at the completion of Phase I of the project in December 1980, 74 wells had been successfully completed. In this first phase, the work was carried out solely by the project and wells given as a direct grant without soliciting participation from other government agencies or the local communities.

In 1981 the direction changed with the commencement of ZDSDP Phase II and the move to institutionalize programs. An agreement was negotiated with the then Ministry of Public Works (MPW), for an expanded program beginning in June 1981. Funding was proposed on a 50:50 basis between MPW and the Australian Government, and a Project Officer from the Pagadian Office of the MPW was seconded to manage the rural water supply program.

The program evolved rapidly from this point as new developments, both technical and sociological, were introduced with endeavours to coordinate with other government agencies involved in water supply. This process has continued and at the end of 1983, the rural water supply program was operated by the District Engineer of the recently merged Ministry of Public Works and Highways. It operates two mechanical cable tool rigs in addition to the original Atlas Copco Rig. It also operates three portable manually operated drilling rigs, has initiated a spring development program and is actively involved in organizing communities to own and operate their own water supply systems.

In the three years of the Phase II rural water supply program to the end of 1983, 162 deep wells had been provided together with 72 spring developments servicing over 300,000 people.

THE RURAL WATER SUPPLY PROGRAM - RWS

The RWS program is an extension of the National Government water supply program. It has a total annual budget of six million pesos equally subscribed to by the Philippines and Australian Governments, for the development of eighty wells and forty springs each year.

Six drilling rigs are used to sink wells, the three manually operated portable cable tool rigs being employed to drill in remote areas without vehicular access. The installation and maintenance of hand pumps is carried out by separate crews following behind the drilling rigs. Spring development is undertaken by three construction gangs with assistance from local barangays. This work has been carried out in remote barangays using available local transport such as carabao and horses to move construction materials to the site.

A water testing laboratory capable of coliform and mineral analysis has

Upper Sibatang, Pagadian City
4000 Litre Ferrocement tank.

been established by the RWS and is made available to all agencies.

The National Government policy on rural water supply emphasises the need for community participation and cost recovery. This is to be accomplished by the formation of Rural Waterworks and Sanitation Associations (RWSA'S) to own and operate the water systems and to repay 90% of the capital cost. Wells are still to be constructed as a grant but the recipient community is expected to maintain the well through on RWSA.

This policy has not been fully introduced in Zamboanga del Sur as the mechanism and guidelines for the implementation have not been worked out. Water supply projects completed by the RWS are still given as grants to the barangays. However, the necessity of identifying needy barangays and seeking community participation has been recognized and introduced.

To determine program priorities, forms seeking information such as the source of water, distance to the collection point, permanence of and number of people using the water source and health problems encountered were distributed with the help of the offices of the Population Commission to each barangay in the province.

This information has since been combined with a barangay mapping exer-

Upper Sibatang, Pagadian City
Spring Intake Box with Drive Pipe to 2" Hydraulic Ram.

cise to form a water resources inventory. Aerial photos and maps detailing the distinguishing topographical features of their barangays were shown to barangay residents. The residents' knowledge of the population distribution and sources of water were sketched on the maps.

The information gained by these procedures has been valuable in refining priorities and has given an overall view of water needs of the province. Whereas previously a barangay was removed from the priority list after receiving one well in the barangay centre, mapping has shown that a single well may only service a small proportion of the population and that realistically 2 or 3 wells may be needed.

Engineering survey and design is carried out on all spring developments by a small group headed by an Engineer. The majority of spring developments to date have been gravity systems where the engineering inputs have been to establish the pipe size required, the route for the pipe line, the distribution within the barrio, the materials required and an estimate of the cost.

Community participation in water supply has been the most difficult aspect to initiate, not through the lack of response from communities but from the problem of providing the trained and motivated personnel to spend the required time with barangay residents. Initially, community participation was sought by calling a barangay assembly which was addressed by an RWS Engineer on the benefits of forming a Rural Water Works and Sanitation Association, this being a government requirement for proceeding with the work. At this meeting the community would agree and proceed to elect officials and organize a workday to assist in construction. However, after construction, with little to do in the early life of the gravity water system, the organization lapsed and when a repair was required nobody would feel responsible.

To remedy this situation a community development worker (CDW) is now employed to devote all his time generating community participation. The task of the community development worker is to take the engineering plans on his initial visit, to meet as many people as possible over several days and canvass feedback on the proposed project. Further visits establish the RWSA and prepare for construction. It can be seen that this is a time consuming process and with only one CDW the coverage of barangays is not completed. The initial response to the CDW organization is good and it is hoped to encourage the MPWH to adopt this approach on a wider scale.

THE TECHNOLOGY

The technology used in the provision of hand pumps and springs developments is simple. An effort has been made to introduce cost effective and appropriate materials and equipment obtainable in the Philippines and acceptable to the MPWH.

The cable tool rigs now used in the program are appropriate because the low operating cost and the ability to fabricate parts locally will ensure their long term use. The three manually operated drilling rigs provided by the MPWH are also very useful as they can be deployed away from the roads as they are easily dismantled and hand carried. They also provide needed employment.

One introduction widely adopted is UPVC for well casing. An evaluation of UPVC casing by the KHON KAEN Drilling center in northeast Thailand in 1978 supported the use of UPVC and recommended procedures for its use. The lower cost of plastic casing and its resistance to corrosion are advantages that have ensured its acceptance.

The use of UPVC casing has been accpeted and proven successful but galvanized iron drop pipe and pump rods are used for installation of the pump cylinder. The life of GI pipe and rods has proven to be very short in often highly corrosive ground water environment. It is proposed to experiment with UPVC drop pipes and stainless steel pump rods in the near future.

The use of stainless steel and UPVC well screens and gravel packing was introdced to increase the life of wells but the idea has not been accepted by the MPWH and most wells continue to be developed with slotted casing. Much of the irrigated rice land along river valleys has a water supply problem as water from shallow wells can be contaminated and water from deep wells is often highly mineralized. The use of sand and other filters for the water from shallow wells could be an economical solution to this problem but has not been tried.

A cast iron hand pump mechanism was introduced to replace the traditional MPWH concrete pedestal in an endeavour to speed installation, lower costs and ease maintenance. The pump handle mechanisms were made by a local foundry to a design used in Thailand. The first of these handles was installed in January 1983. They have proven to be robust and easy to use so far.

Electric pumps have been installed to distribute water in heavily populated barangays to increase the water available from a point source. Pumps have been selected on the availability of local servicing as these schemes are operated by community RWSA's. These projects have been popular and the operation and management readily accepted by the RWSA's.

Plastic pipe, both polythylene and polybutylene, has been used extensively in the spring development program. The advantages of this pipe over the previously used galvanized iron are its lower cost, resistance to corrosion and ease of installation. Saddleclamps have been introduced to simplify the service connections, all this resulting in easier and faster installation.

Hydraulic rams have been introduced, allowing development of springs at a lower elevation than the barangay. A small ram with a 50mm drive pipe was installed to demonstrate the principles but it was soon realized that larger capacity rams were needed for the large springs and high lifts which are common in the Province. Rams for 100mm drive pipe were fabricated locally, installed, tested and modified. The latest rams produced are expected to give long service on heads up to 100 meters. Local machine shops have been contracted to supply both 50mm and 100mm hydraulic rams.

A recent introduction has been the construction of ferrocement tanks. These have been built in two sizes, 5,000 litres and 18,000 litres. The first tanks built have practically demonstrated their advantages of low cost and ease of construction and maintenance. The smaller tanks are built by plastering over a framework of steel bar and chicken wire without requiring any formwork. The larger tanks use an internal reusable form which is wrapped with steel reinforcing of chicken wire and plain wire. The provision of low cost water storage has enabled low yield springs to be considered for development by collecting the night flow for use during the day.

CONCLUSION

The rural water supply program has resulted in the establishment of the mechanism for co-ordination of all government agencies on rural water supply in the Province ensuring a more efficient and effective delivery of services and the elimination of wasteful overlapping of programs.

The identification and assignment of a priority to all barangays together with the introduction of cost effective and appropriate technology has lowered unit costs and brought water supply to remote areas.

The introcution of community participation to own and operate barangay water projects and the piloting of a community development worker to better achieve community participation has proven a difficult but worthwhile experience. This has resulted in greater support for RWS allowing more barangays to be serviced by the program.

The institutionalization of the operation into the MPWH District Engineer's Office has enabled the local staff and workforce to gain experience, thereby retaining the knowledge in the Province for continuing development.

THE COMMUNITY DEVELOPMENT WORKER PROGRAM OF ZDSDP

Wayne J.K. Haslam - Executive Officer

INTRODUCTION

A major problem identified in the process or institutionalisation in ZDSDP was the lack of active participation and involvement of the beneficiaries of the development programmes. The Project recognised its own limitations in undertaking a programme to develop the necessary community organisation skills required for the adoption and sustaining of the development activities. A programme was therefore piloted with the employment of Community Development Workers (CDW's) to act at the interface between the Project and its programme beneficiaries to provide the necessary two-way flow of information.

THE NEED

It was found that the majority of rural barangays did not have sufficient community organisation or structure to be able to articulate their problems and seek assistance. There was little evidence of self-reliance or the ability to plan community activities. It was apparent that the more deprived people would have difficulty in accepting higher technology both in agriculture and infrastructure. Clearly there was a requirement to identify the needs and priorities of potential beneficiaries and inform them about the project programmes while at the same time assisting them to develop a community structure which would ensure their participation in decisions concerning their own future.

The experience of the National Irrigation Authority (NIA) showed that persons skilled in community development work and living in target barangays could readily relate to the people, assist them with strengthening their community organisation and inform them of NIA's programmes. They served as intermediaries between villagers and the line agencies.

Agricultural programmes in crops and livestock have been researched, packaged and extended to upland farmer beneficiaries. There has been little opportunity for farmer participation in the development of these packages. This has meant that a great deal of effort has been required later on in modifying packages to achieve relevance at farm level. Had farmers been involved at the beginning the degree of modification would have been less.

On the Project's irrigation scheme there was a need to inform farmers about the coming disruption to their farming operations during construction. It was also thought desirable to inform them about likely social and economic effects in advance.

Experience has shown that having the full participation of beneficiaries during construction and having them actively involved in the construction of the Project as skilled and semi-skilled labourers has resulted in their understanding the way in which the project should operate and be maintained. As construction progressed and areas came into production it was clear that Irrigator's Associations and Co-operatives would play an important part in the

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* Extract from a paper entitled "The Role of Community Development Workers in Infrastructure and Agricultural Development Projects". The Road Engineering Association of Asia and Australia, 22-36 August 1983, Jakarta Indonesia.

overall management of the scheme. It is in these areas of activity that a CDW is most effective.

Involvement of beneficiaries in introducing a rural water supply programmes was recognised as most important to ensure they understood the type of service to be provided. This could be a well or spring development feeding a number of a community faucets. The beneficiaries had to understand the working of the system to effectively assist in the installation of the facility. This is an effective way of reducing costs and problems of future maintenance. Where an underground source was tapped by drilling, the barangay often elected to install an electric pump. This required the formation of a group to operate and maintain the system.

In the Project's road programme it was necessary to fully inform beneficiaries of the requirements of right-of-way and to elicit their support and assistance in best locating the road. In constructing low cost roads, the participation and cooperation of local villagers in the construction process can significantly reduce the cost and facilitate future maintenance.

ADOPTED APPROACH

In line with its institutionalisation objective the Project decided to seek the full participation of agencies in identifying a means whereby beneficiaries could be drawn into the planning process. The Project commissioned a seminar/workshop under the name of "Leadership Effectiveness and New Strategies" to be conducted by the Institute of Cultural Affairs, Philippines (1982). This seminar involved representatives of the cooperating government agencies. It achieved concensus on a method of improving the acceptance of agency and project programs by the rural poor of Zamboanga del Sur.

The workshop participants examined the problems and constraints. A list was prepared stating problems in order of importance. They were:

Uncoordinated National Agency Programs
Inequitable Resource Distribution
Misused Public Office
Lack of Management Expertise
Inadequate Information on Government Programmes
Ineffective Local Organisation
Low Level of Education
Restricted Services Delivery
Limited Government Financial Resources

A strategic and practical proposal was then developed by participants which led to a tactical system chart within an implementation time frame. Instrumental in solving the problems defined was the Community Development Worker. The placement of a CDW in the position of intermediary and facilitator was considered vital. His function was to;

- establish rapport with the community
- act as a catalyst in the community
- assist in the identification of natural community leaders
- act as a coordinator between agency and community
- facilitate effective delivery of government service in the best interests of the beneficiaries
- act as the agency's means of establishing credibility

- be a practical research facilitator
- be a training facilitator
- disseminate information
- monitor and feedback.

The community development workers need to be innovative, have organisational ability and some skill in the use of group dynamics. They should be college graduates, preferably with a background in social sciences, and be prepared to undergo the necessary pre-service training. The community development worker would be fluent in the local dialect, physically fit and able to monitor and report his activities.

DEVELOPMENT OF THE MODEL

The complex role of the CDW in the cultural, political and economic processes in the community can best be explained in a model clearly identifying his position in relation to the various forces in the development process. A model was developed and is shown in Figure 1. From the consideration of this model and the project objectives, a logical framework matrix was developed to identify the components of the proposal. This is shown in Figure 2.

The Community Development Worker plays the multiple role of encourager, facilitator and mediator. His encouraging and facilitating roles are seen in his community development activities. His mediating role is played in establishing the agency and community linkages. Thus he is instrumental in linking the community organised groups' unfulfilled needs with the agency's existing programs and resources.

The CDW's job operates within the framework of a community development process initiated for the purpose of promoting locally planned changes. The framework includes;

a) linkage with the Project Organisation
b) linkage with the Government Agencies and the Non Government Organisations (NGO's).
c) linkage with the Community

The CDW linkage with the Project organisation is basically administrative because it is the Project that employs his services. The Project organisation needs to efficiently and effectively manage the coordination of the NGO's and agency inputs and assistance through such activities as integrated area development planning workshops, coordination meetings and reviews wherein the CDW's are participants.

The CDW's linkages with the line agencies and NGO's is explained by his representation of the interests of organised groups and communities.

INSTITUTIONAL ASPECTS

It is essential that the number and functions of linkages be clearly identified within the prevailing institutional structure. Development projects need to establish an interface with ultimately responsible line agencies. If a project seeks to increase the capacity and capability of line agencies to generate technologies for development and promote them to the rural poor, it is essential that the technologies be generated with the complete involvement and cooperation of both the line agency and the beneficiaries.

COMMUNITY DEVELOPMENT WORKER PROGRAM MODEL

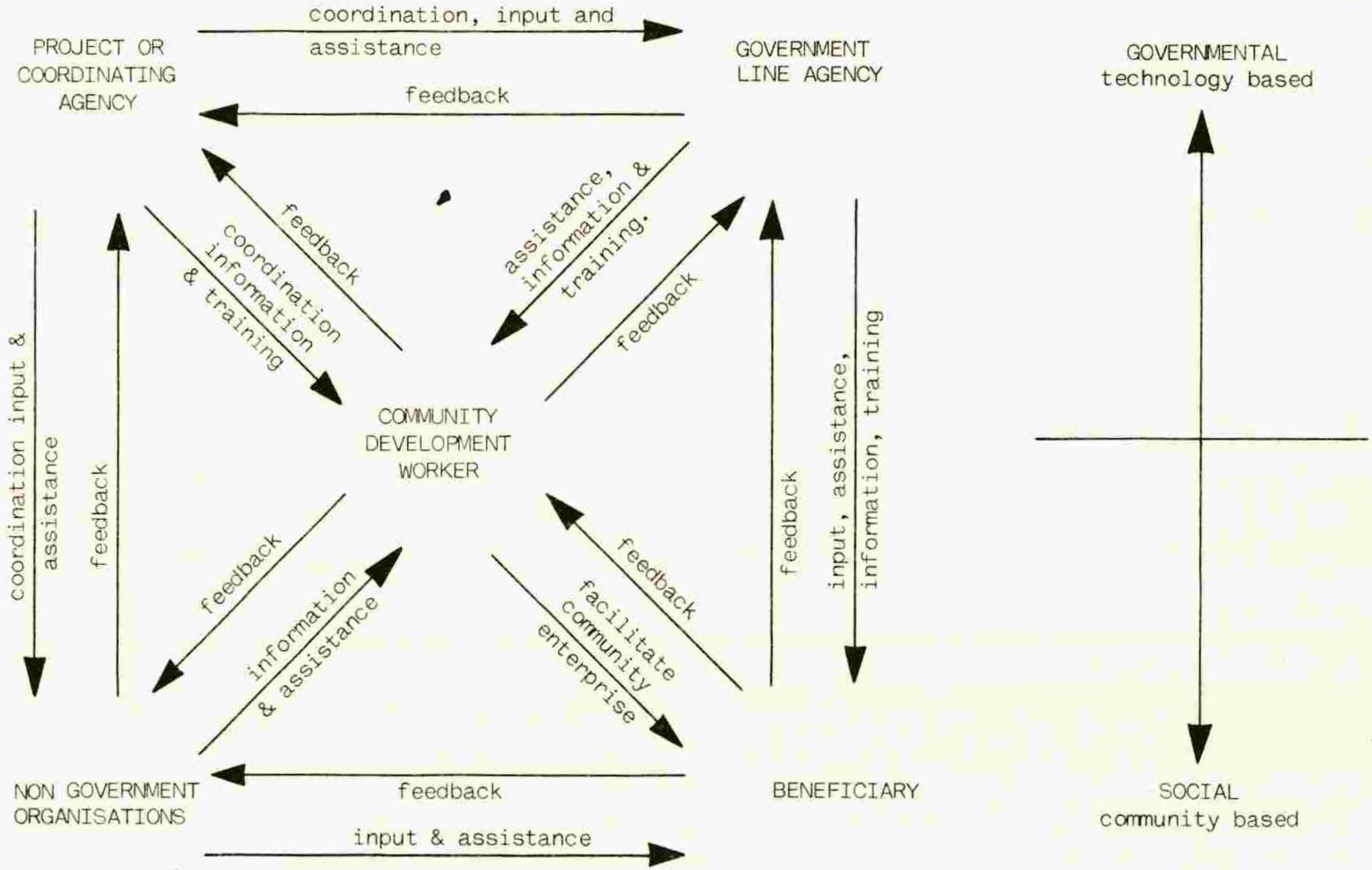
PROJECT OR COORDINATING AGENCY
coordination, input and assistance
GOVERNMENT LINE AGENCY
feedback
GOVERNMENTAL technology based
coordination input & assistance
feedback
feedback
coordination information & training
assistance, information & training.
feedback
feedback
input, assistance, information, training
COMMUNITY DEVELOPMENT WORKER
feedback
information & assistance
facilitate community enterprise
feedback
NON GOVERNMENT ORGANISATIONS
feedback
input & assistance
BENEFICIARY
SOCIAL community based

FIGURE 1.

LOGICAL FRAMEWORK MATRIX - ZDSDP COMMUNITY DEVELOPMENT WORKER PROGRAM W.J.K. H. 1982

GOALS HIERARCHY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	CAUSAL LINKAGE ASSUMPTIONS
Programme Goal To raise living standards in the rural communities through more rapid and self sustaining rural development by a "bottom up" approach with active participation of proposed beneficiaries in identification planning and implementation.	Changes in social indicators within communities. Changes in attitude of rural communities towards agency programs and vice versa. Increased interaction between agencies and rural communities. More efficient delivery of services.	Comparison of benchmark surveys taken at various times throughout the life of the Project. Established rapport between Barangays and agencies.	Improved delivery of services and a better understanding between Barangay people and the agencies will lead to beneficiary participation in a "bottom up" approach to development. A "bottom up" approach will result in more rapid and self sustaining development efforts whereby development can be accelerated in rural areas through the activation and participation of the beneficiaries.
Programme Purpose To develop community awareness and formation to a level of self reliance necessary to ensure a self sustaining development effort directed by the rural beneficiaries and supported by non government organisations and Government agencies. To facilitate a closer relationship between agencies and the Barangays.	More articulate and active community. More community involvement in development programs, smoother implementation of projects. Less altercation and dispute over programs. Improved agency performance at program level. Self sustaining programs directed by rural folk.	Recognized community organisational structure. Number of ongoing development projects. Production of survey reports. Number of agency staff visits to Barangays. Number and results of Barangay meetings.	Assistance with community formation and facilitating interaction between the rural beneficiaries and the Government and Non Government organisations will initiate self sustaining development projects identified, planned and implemented by the beneficiaries themselves but supported by the agencies. Interaction with the agencies will establish a closer link between the Barangays and the agencies, leading to a more efficient delivery of services.
Project Outputs Improved Community Formation. Increased involvment of rural poor in identifying and implementing development projects. Increased information dissemination to Barangays from non government and Government organisations. Increased interaction between beneficiaries and implementing agencies for mutual development.	Established and operating community organisations. Established development programs. Beneficiary involvement in programs. Information concerning development available in Barangays. Increased agency presence in Barangays.	Development programme reports. Information dissemination reports. Agency reports.	
Project Inputs Development Worker Staff. Information Aids. Training Equipment. Training Staff (line agencies).	Access to a Community Development Worker. Information availability. Beneficiary training activities. Number and classification of training staff in agencies assigned to rural training.	Staffing reports (Project Agency) CDW reports. Equipment reports. Agency training programme reports.	The presence of a community development worker assisting in community formation to develop self reliance and facilitate community enterprise can lead to increased development of the Barangays. This development can be complimented by the efforts of non-government organisations and the government agencies with the development worker facilitating the link between the agency and the community.

Figure 2.

While a particular line agency might indicate a need for a community development worker to assist with its individual programmes, the same development worker can often facilitate the programme of other agencies at the same time. Development workers can therefore be employed on a cost sharing basis by the line agencies cooperating in the development Project. The development workers should ultimately be answerable to the coordinating agency for developmental projects.

On the Zamboanga del Sur Development Project the responsibility for coordination is with the Provincial Development Staff through the Provincial Development Council representing all line agencies in the Province. At present (1984) the Provincial Government resources are not adequate to shoulder the cost of development workers and they are being funded out of the Australian counterpart's contribution to the Project.

Although all agencies present at the seminar/workshop indicated a real awareness of the need for development workers, only the National Irrigation Authority has employed such persons locally.

ACHIEVEMENTS AND CONCLUSIONS

The Project has directly employed 9 CDW's over an 18 month period to the end of 1983. In this period there have been a number of unsolicited comments from various local officials citing benefits from having community development workers assist their administrative functions. Such assistance has been through the development of community participation in decisions affecting the barangay. They have facilitated at community meetings and succeeded in giving officials a very clear indication of the wishes of the community.

Beneficiaries of major infrastructure programs have become well informed before implementation and have been able to participate in planning and provide feedback to the Project concerning their wishes and the effects that the programme might have on their communities. This has greatly assisted construction and subsequent maintenance work.

The community development worker programme has significantly reduced the number of complaints received at the Project Office. They are now dealt with at the community level.

In other parts of the Philippines line agencies are employing community development workers under a range of titles giving recognition to the usefulness of such persons in development projects.

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SOCIAL DEVELOPMENT PROGRAM OF ZDSDP

S.A. Leenhouts - Social Scientist

INTRODUCTION

The social development programme of the Project will have just begun its implementation phase as this paper is being published. Due to start in January of 1984, it will span the remaining two years of the Project's life. The programme was designed using the results of a major sociological study of the province.[1] The surveys took place in 1976 and 1981. Initial results were available in 1977 and August, 1983. Other inputs into the design came from pilot social welfare activities undertaken by the Project and from community development workers hired by the Project, located in remote barrios at the ends of the road network. Social sector and line agency branch offices of Pagadian City and the Province of Zamboanga del Sur were involved in the final design of the programme.

OBJECTIVES

As is the case with all components of the Project, this programme had to meet the overall goals of:

- Raising the living standards of the majority of the population in the project area, while
- Generating a self sustaining development effort employing existing institutions.

The sociological study revealed that although there were significant increases in family mobility and income from 1976 to 1981, little change had taken place in the health statistics available. Furthermore no perceived change had taken place in the health status of either the family or the barrio. Results of small scale nutrition programmes in the City and at the nutriward of the provincial hospital indicated serious misconceptions of basic nutrition and health knowledge amongst local residents and patient's parents. Community development workers' fortnightly reports to the Project indicated serious overlapping and discoordination of government services in the health/nutrition arena at the barrio level. Meetings between the Project's social scientist and the provincial Nutrition Committee revealed an institutional concern to more effectively coordinate the health/nutrition efforts, especially with regard to infants and small children.

It was decided that, in the context of social development, the best accomplishment of the Project goals would come about through a programme that addressed the health, nutrition and educational issues of children aged 0 to 5 years utilising existing agency and barrio resources. There was a common understanding amongst all those who participated in this goal definition, that the most critical human resource for the future of the province was the youngest generation. Work with this target group would inform provincial planners and parents alike of possible programmes and strategies to be employed with future generations. This is especially relevant as the population growth of the province has only slightly slowed and migration into the province continues.

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[1] by the Institute of Philippine Culture

The logical framework statement of the sectoral goal for the programme is:

> To improve the nutritional, health and educational status of target children in selected barangays.

The related project purpose is:

> To improve the delivery of services by coordinating and integrating existing social agency inputs for nutritional sufficiency, then preventative health and early learning, through City and Provincial pilot units.

DESIGN

The programme has been divided into two phases coinciding with the calendar years 1984 and 1985. The first phase emphasis is to establish two pilot barangay units, one in the Province and one in the City. The second phase will expand the program to further locations as funds and personnel allow.

The participation of three social line agencies is currently planned, the Ministry of Social Services and Development (MSSD), the Ministry of Health (MOH), and the Ministry of Education, Culture and Sports (MECS). Additional provincial involvement will be through the barangay nutrition scholars (BNS) and additional City involvement through community development workers (CDW). Significant Ministry of Agriculture (MA) involvement is also anticipated. Each of these institutions currently conduct programmes that address the nutrition problem either directly or indirectly:

MSSD - Supplemental feeding centers.
- Day care centers.
- Self-employment assistance schemes for day care support.

MOH - Nutripak manufacture and distribution.
- Hospital nutriward and village based nutrihut malnourished rehabilitation programmes.
- Deworming campaigns.

MECS - Parent education courses.
- Vocational skills training for parents.
- Adult literary courses.

These MECS programmes address the nutrition issue indirectly, from a parental development and income generation perspective.

BNS - Regular weighing of children.
- Monitoring severely malnourished cases.
- Nutrition education campaigns.

CDW - Initiate and coordinate development efforts at the barrio level under the City Development Coordinator.

MA - Curriculum and advice of the home management technicians.
- Income generation through agricultural productivity.

This impressive list of inputs is dependant on the fact that there should be from each of the first three institutions, full time personnel on-site in the barrio carrying out their respective programs.

Most development planners would agree that even such a battery of activities, fully staffed and funded, would not have much impact in a local situation without the full participation of resident leaders and groups. Therefore in the design of this programme, the barrio counterpart (in whatever form) is seen as equal to the above list of institutional contributions.

The institutional dimensions of the program are important here. The ultimate goal is to create a self-sustaining development effort at the most effective level. This program fully intends to develop such means at the family level in the barangay, and to significantly reduce future dependence upon government services for nutritional sufficiency, if not totally eliminate it. Anything less denies the potential of the rural populace and removes the real institutional challenge facing the government.

That challenge is to develop in every barrio of every municipality the capacity and capability to feed the people and maintain a physical and mental vitality in the local community, most especially among the children. The mark of success would be the dismantling of every nutrition related programme at the provincial level, except for special case and disaster relief.

STRATEGIES

This program will utilize five key strategies, all of which must operate to transform the status of the target group:

1. Nutritional sufficiency.
2. Preventative health care.
3. Early learning.
4. Parental awareness.
5. Homebased income generation.

Substrategies are as follows:

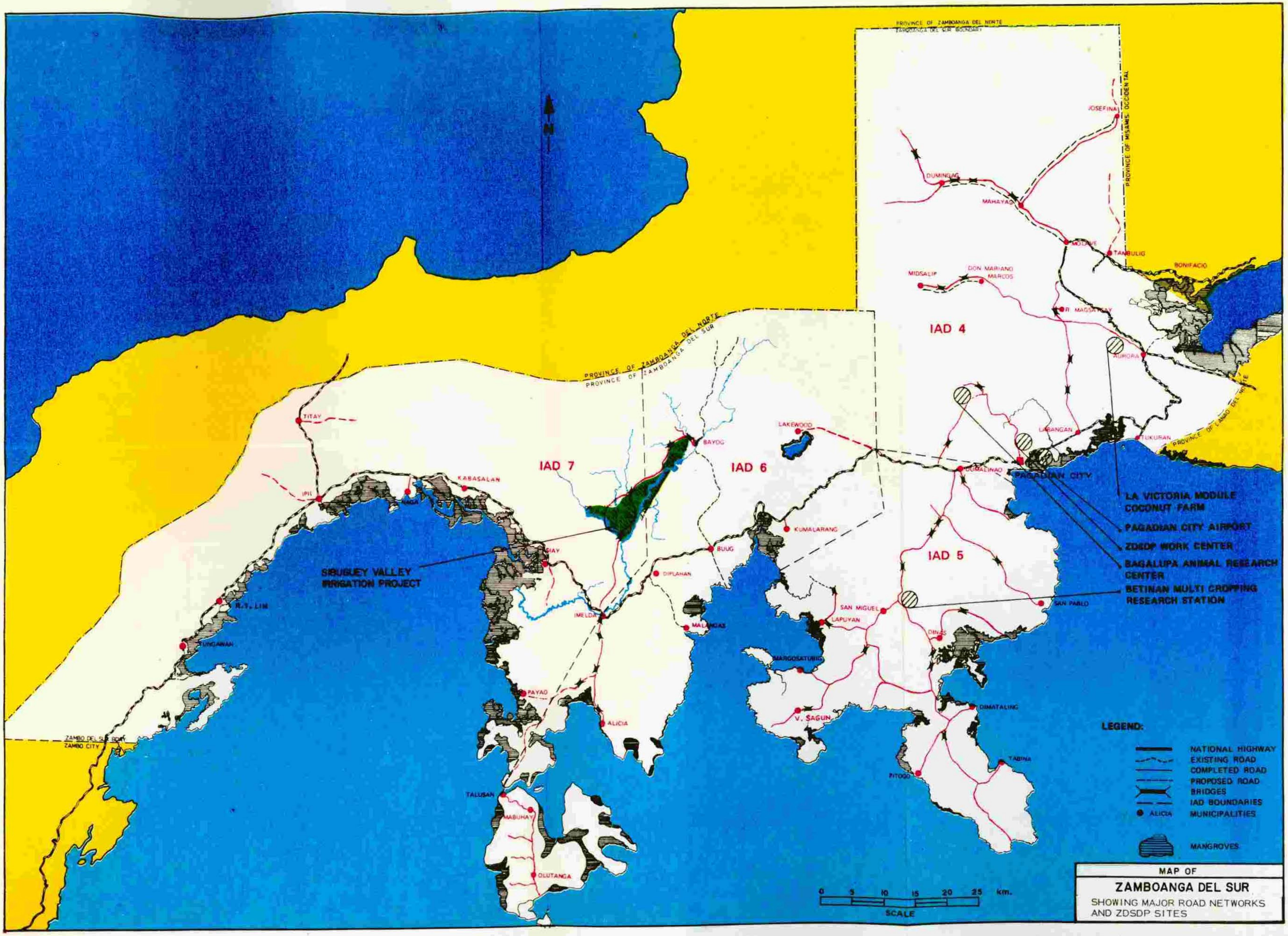
1. Nutritional sufficiency
    - Diet diversification
    - Home vegetable cultivation
    - Home fishpond technology
    - Food resource planning
2. Preventative health care
    - Easy access to clean water and hot water
    - Adequate waste drainage
    - Deworm and vaccinate every resident
    - Local market sanitation improvements

3. Early learning
   - Toilet and bathing habits
   - Garden practice
   - Pre-elementary curriculum
   - Physical education and motor-skill development
4. Parental awareness
   - Food-body-disease relationships
   - Basic functional literacy
   - Child development guidelines
   - Home improvement projects
5. Homebased income generation
   - Small sideline loan availability
   - Goods transport facilities
   - Local resource utilization research
   - Appropriate craft skills training

These strategies and substrategies are intended to provide a comprehensive "frame" for engaging the resources of the various institutions that will involved in the programme. The five strategies acknowledge the interrelation of different constraints that operate on under-five children. Strategy One ensures that food is available through local means, and denies the viability of external food support except in emergency cases. Strategy Two aims to prevent health problems before they start, to allow available nutrients to be used by the body free from the draining effects of parasites and infections. Strategy Three admits that the proper care and creative use of the mind and body in itself has a healing and motivational effect. Strategy Four addresses the parents who are the managers of the child's development and growth, to provide the conceptual and practical means for enhanced child development. Strategy Five intends to meet the underlying constraints of low income which, besides reducing food intake, often forces the mother out of the house to seek work, and the children to fend for themselves.

How these strategies will operate in practice at the barrio level is yet to be seen. It is the intent of the pilot phase to provide a chance for the programme to adjust itself to the particular characteristics of local community and family life in Zamboanga del Sur and Pagadian City.

Initial, midterm and final surveys of the nutritional, health and educational status of the target groups in each barrio will be conducted, the results of which will be used to determine the impact of the programme.



MAP OF

ZAMBOANGA DEL SUR

SHOWING MAJOR ROAD NETWORKS AND ZDSDP SITES